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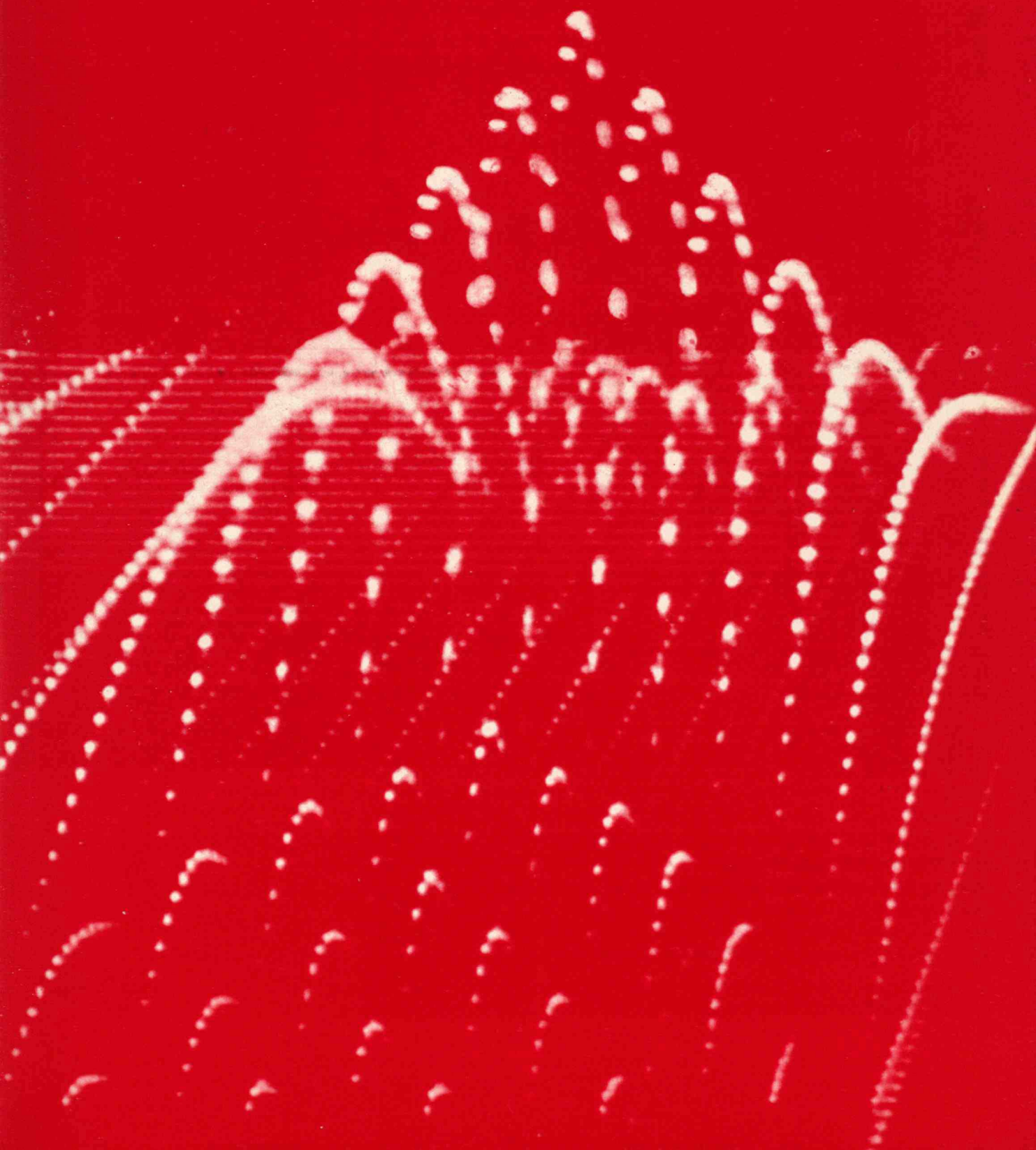
Goldblith: The World Food Crisis

Morgan: Creating Employment Opportunities



# Technology Review

Boehm: Electrical Engineering for Tomorrow

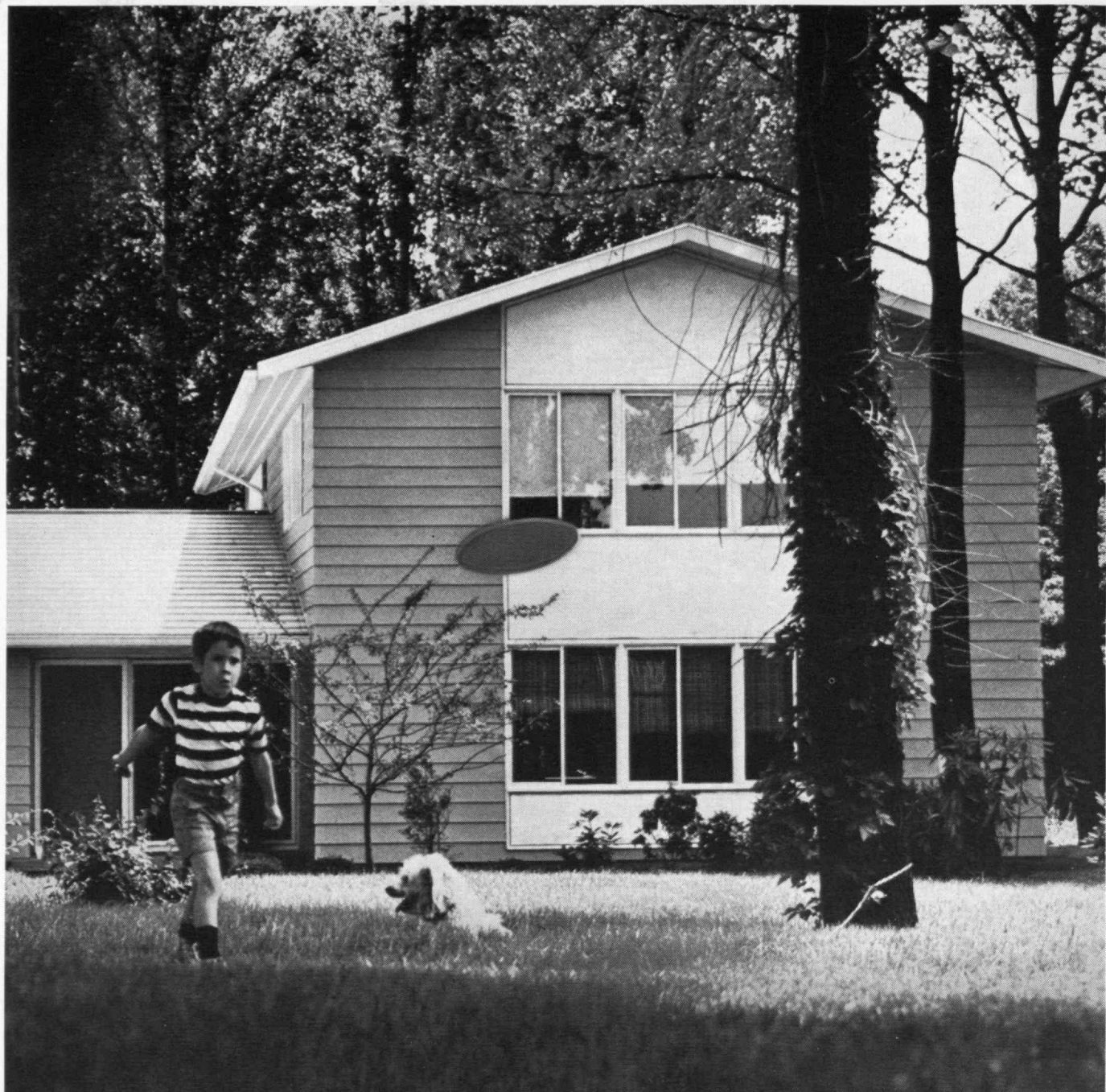


# technology review

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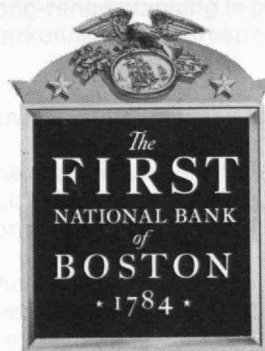
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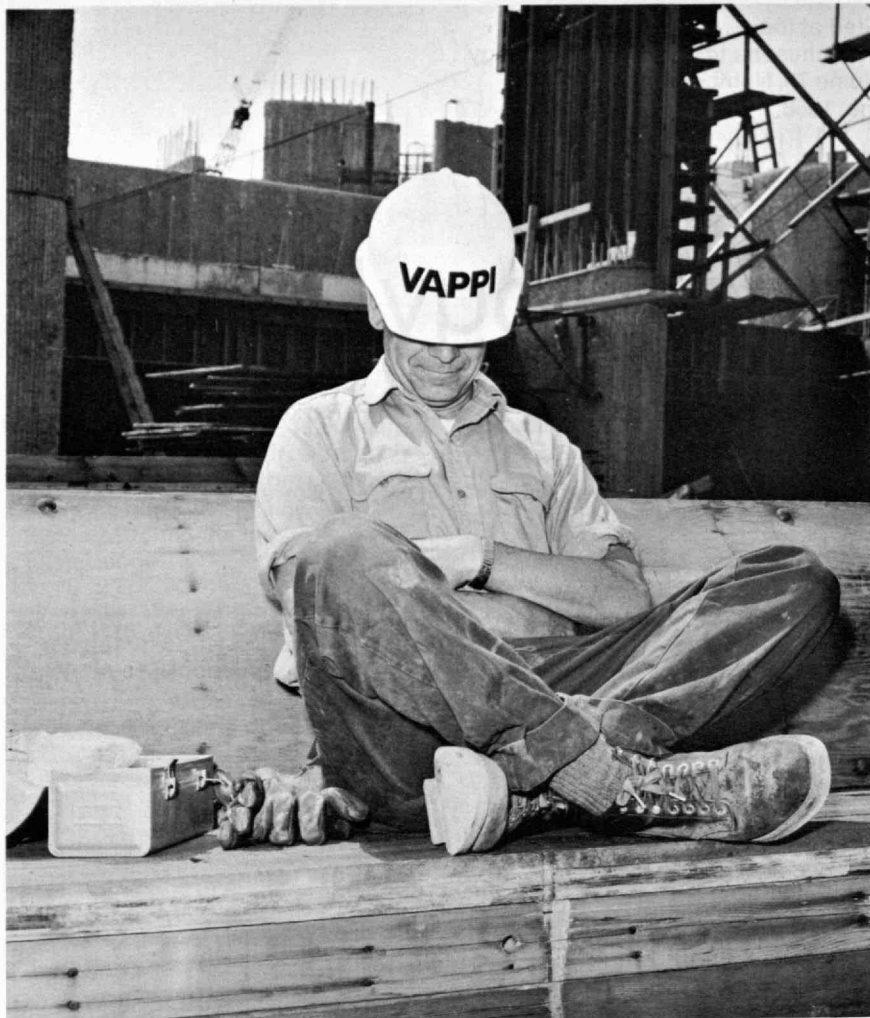
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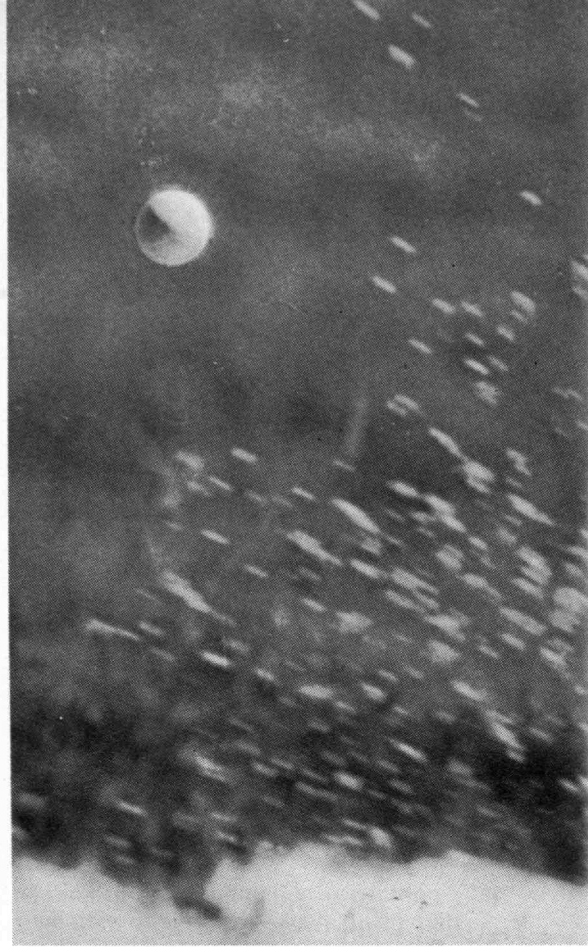
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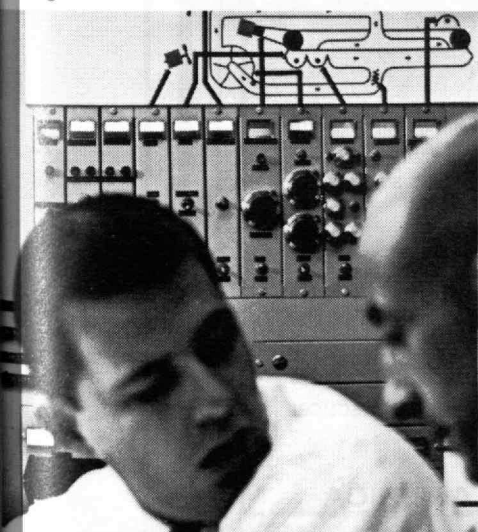
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# Science and Crime

A station wagon impounded by a game warden during a closed hunting season yields a splatter of stains shown to be fresh deer blood. The contents of a can labeled as haddock provide patterns of protein for both haddock and cod. A collapsed structure in a housing project presents on examination flaws within several metal members. A quantity of amphetamine is found in the body of the driver pulled from a truck which initiated a multi-car free-way collision. In each of these instances, a scientific analysis can expand our knowledge of what happened. The various scientific skills involved can furnish information vital to the decision processes of the social community. Personal, or perhaps corporate, responsibility then can be inferred from the combination of facts issuing from scientific and other sources.

To the man on the street, the physical sciences are tools common to the detection and solution of crimes. The careless fingerprint, the unnoticed bloodstain, and the spent pistol slug are a few of the well-known physical items which figure in crime detection—in the Sunday supplement, on the television tube, and in fact in the police station. The usefulness of scientific knowledge, particularly in the physical and biological sciences, is well established. Yet how common is the utilization of this knowledge in the hourly contest against crime?

## Communications and Systems Analysis

The technologies of communications, transportation, and, lately, systems analysis have proven fertile for application to the problems of administering criminal justice under law. One combination of these technologies yielded a method for immediate response to public distress calls for police service. An application of systems analysis is now being studied for effective supervision over offenders released conditionally into the community. Other technologies give material aid in furnishing product samples as standards and research assistance. A few industries—for example, communications systems and security—have developed on the basis of the applications of technology to criminal detection,

and these extensions of technology enhance the chances of deterring or detecting criminal violators. However, the fruitful use of such technologies is but one step, for each criminal violation must be shown to be, in fact, a breaking of the law and must be linked to a specific individual. It is here, between the discovery of a criminal occurrence and the imposition of a social penalty on the responsible individual, that utilization of scientific knowledge can often supply the critical links of proof.

And such utilization does *not* occur in 98 per cent of known criminal violations.

## Restraints in the Application of Science

This startling figure requires an explanation, since some expert scientific testimony is usually presented in criminal cases that reach public notice through the press. Official notice of a suspected criminal violation starts an intricate process with unanticipated variations according to local practice and to personalities. The extent and effectiveness of scientific involvement, when available, is dependent upon the workings, or ramblings, of this process.

Roughly, three levels can be described where scientific aid can be utilized between occurrence and penalty. These levels can be separated in terms of the investigator who has to decide whether a criminal violation has occurred, and, if so, to locate the responsible individual; the administrator—police, prosecutor, or defense—who has to decide if the investigator has presented a case for commission of the alleged violation by the suspected individual; and the adjudicator and/or juror who has to decide the innocence or guilt of the specific individual.

The initial steps in the investigation of a suspected criminal violation can easily nullify any possible help by scientific personnel. A first determinant in the use of scientific aid is the organizational structure by which the violation receives attention. The first official concerned is usually not a specialist in investigation, and he rarely requests scientific help directly. If further investigation

is decided upon, the limits of available manpower with investigational ability and experience prevent scientific scrutiny of many violations.

A physical act against a person or property means a contact that leaves traces, but many investigators put this fact too low in their operational procedures, and so many physical traces prove irretrievable and are lost. Comprehensive samplings of the site of the violation and from suspected participants are vital to the preservation of marginal clues as to how things were and what things were involved. Recognition and recovery of some traces are limited by actual or presumed constitutional restrictions. And many investigators are reluctant to call for scientific aid because a good deal of it tends to be too little and too late to be of substantial help in making decisions. The investigator's responsibility to search for traces is particularly heavy however, since the importance of any physical trace may not become clear until later examinations, analyses, and interpretations are made. And in fact, physical objects from an estimated 400,000 violations will reach the doors of scientific laboratories this year.

In each of these cases, documented results and interpretations by scientific personnel will be added to other information developed by the investigator for action on the administrative level, first in the police system and then in the prosecutor's office. The laboratory report may consist solely of a conclusion, possibly qualified. Obviously, the importance of the laboratory findings is subject to the understanding of each individual making a decision along the route. Underevaluation as well as overevaluation of the information can effect the course of a case towards the decision to prosecute or release.

The information produced by scientific study reaches its climatic importance for the specific individual on the adjudicative level. In this arena, the relative importance of scientifically determined facts and attending interpretations can be lost in several ways. If the presentation by the scientist does



The "Peacekeeper" police car proposed by Aerojet-General Corporation represents a brute-force confrontation of crime by technology. The car, heavily armored (including tire-protectors) and equipped with a low-light-level television system to let its operator see in the dark, is advocated to give police "an edge over their lawless adversaries." (Photo Aerojet-General Corporation)

not offer a clear reconstruction of events and their sequence, his facts and interpretations are likely to be misconstrued. The questioning by advocates and the bench must test vigorously facts, interpretations and reconstruction, particularly in terms of reliability; if the responses are faulted, the adjudicator and/or juror may reject, erroneously and unconditionally, the product of scientific study.

Utilization of scientific knowledge in the administration of criminal justice is limited severely by these problems of decision outside of the laboratory. If it is socially desirable to have knowledge about a crime as complete as humanly possible, then the application of the physical sciences to this area requires serious consideration and intensive study. The dearth of factual information on the decisions by which justice is weighed compounds the difficulty of solution.

#### **Toward a Science of Criminalistics**

Other restraints are to be found within the scientific service itself. As a consequence of the external (and oftentimes internal) administration control of scientific laboratories by police and sheriffs' departments, the quality and quantity of these operations leave much to be desired. The eagerness with which a room is labeled a "crime laboratory" contrasts sharply with the slowness with which the room becomes in fact a crime laboratory. In the past, and unfortunately too often in the present, staffing has consisted of assigning an officer to be a scientist. Recruitment of scientists as civilian employees is difficult because rates of pay and facilities for working are usually poor; the workload is excessive; the work schedule is unsettled due to the random arrival of case material, changing priorities, and demands for court appearance; and opportunities for advancement are easily throttled by the pressures of the system. These considerations have prompted some discussion of separating scientific services from even nominal control by either police or prosecutor systems by relocating them under judicial administration or under administration by a science and technology department.



A further limitation on the role of science is the preparation of the scientist himself. Science applied to criminology is a sophisticated profession. The examining scientist must capitalize upon all the informational content of each single physical object, and he must so order the analyses to be performed that all desired bits of information are obtained. A scientist trained as a chemist must reorient himself towards other disciplines so that he does not destroy, partially or wholly, the opportunity for further analyses of the object by others.

The operational procedure is directed at establishing, within the limits of the scientific approach, the involvement of a specific individual. Most scientific endeavor, on the other hand, is focused on the characteristics of a population rather than of an individual as a goal. The attitudes and abilities for co-ordinating multidiscipline analyses and interpreting individualization are the criteria of the termed criminalistics.

If the contributions of the physical disciplines, and particularly those of the infant criminalistics, are to be meaningful in dealing with the social problem of crime, the difficulties of utilization must be resolved. A free society, if "created as a means of securing and advancing the bounds of freedom for the individuals who live

within it," cannot set aside lightly the source of scientific knowledge available from such an interdisciplinary approach.

Brian Parker, '53, is Assistant Professor of Criminalistics at the University of California (Berkeley). He studied law at Northwestern University following graduation from M.I.T., and he has taught law and criminology at the University of Puerto Rico while serving with the Department of Justice of the Commonwealth of Puerto Rico.

# Mexico's Mirror of Grandeur

"In Mexico," says José L. Lorenzo, "archaeology lives before your eyes." I know what he means.

In Mérida, Yucatán, recently, the Mayan boy who was shining my shoes looked up at one point with a broad smile. For a long moment, I thought I was looking at the face I had seen on an old jar in the museum.

Raimundo, like many of his compatriots, retains much of the racial quality of the famed preconquest Mayas who built the fabled cities. In the countryside, much of the ancient way of life goes on as well.

Yet Dr. Lorenzo's observation has a deeper meaning. In Mexico, the "New World" was old and highly civilized before Cortés arrived. Mexicans today have pride in their fast-paced development as an industrial nation. In building their sense of national identity, however, they also look to the mighty Indian civilizations of the past.

They know their ancestors were thriving before 22,000 B.C.—the oldest reliable date for man in Mesoamerica. And they know that there existed here civilizations that, by the time of the conquest, rivaled those of ancient Sumeria or Egypt.

## 24,000 Years of History

As chief of the Department of Prehistory of the National Institute of Anthropology and History (I.N.A.H.), Dr. Lorenzo is particularly aware of the relevance of Mexico's past. "We can't study the remote past as something exotic, unrelated to today," he explains. "Our history is there 24,000 years ago. In a real sense, we were there then. We can't divorce our past from our present and, to some extent, our future.

"We can't speak, as do some Europeans, saying 'our very roots are where we are.' We are a mixed country. The European part of our heritage is well known. But for the other part we have to look to archaeology. So, in Mexican archaeology, we are building up our history before the time of recorded history."

A growing awareness of this unwritten history inspires Mexicanos. Juan González Acevedo, bull fighter turned taxi driver-guide, came out with it spontaneously. We were driving back from a visit to the Valley of Mexico's oldest city, Teotihuacán (teh-oh-tee-wah-KAHN, 200 B.C. to 600 A.D.), when he suddenly exclaimed:

"It makes me feel proud. I'm not Indian. I'm not Spanish. One time, when people called you 'Indian' it made a Mexican feel downgraded. It was like an insult. We did not remember the great Indian civilizations here.

"Now I am proud to have drops of Indian blood. I guess I am proud to have drops of Spanish blood too. It's the archaeology, the National Museum of Anthropology [where Mexico displays its Indian heritage with verve and eloquence] that makes us aware of the great Indian civilizations. Now I guess, 99 per cent of the people are proud to have Indian blood."

## Urban Living in 1000 B.C.

Archaeologists are steadily filling in the story of how this Indian background evolved. Remains of vegetable food caches in dry caves, dateable by radioactive techniques, and stone artifacts, dateable by other means, help pin down the early chronology. From 10,000 B.C. onward, men in some places, such as the Valley of Oaxaca, turned slowly from hunting/gathering to plant cultivation and, finally—by 5000 B.C., to true farming.

Eventually, during the first millennium B.C., religious centers with pyramids and stone buildings arose. In some places, such as the Mayan Dzibilchaltun (dzee-beel-chal-TUNE) in Yucatán or Teotihuacán, true urban living developed for city populations of perhaps 50,000 to 100,000.

Several civilizations had come and gone before Cortés appeared. He found stone-age peoples living lives regulated in detail by religious ceremony. The conquistadores looked down upon these heathen. But archaeologists now regard their achievements and those of their predecessors as mighty.

Among them, the varied peoples the Spanish conquered had a mathematics that involved positional notation and the concept of zero. Their astronomers calculated planetary positions and foretold eclipses. The Mayan calendar kept track of the years with greater accuracy than does our own reckoning.

More significantly, these early Mexicans evolved political, administrative, and military systems for conducting the business of proper nation-states. They had, in some places, irrigation farming. They carried out a busy international trade. The market places of the Aztecs rivaled those of Europe.

Discoveries of recent years give archaeologists a new perspective on the more than 2,000 years of cultural development that underlay the societies Cortés saw. Ignacio Bernal, Director of I.N.A.H. explains:

"We have new concepts. We have a much better understanding of the nature of Indian society. We have more understanding of its political, economic, and religious structure.

"It has become clearer how this is related to ceremonialism. Ceremony was something engrained in the Indian thought. It was how things were done, how things were thought about. Cities were divided ceremonially. For those people, the whole world was ceremony. The whole man was ceremony."

Yet, while religion set the tone of life, practical demands of state determined much of the action. The nature of warfare illustrates this.

Experts had considered war a highly religious activity. They thought, for example, that it was carried out mainly to get captives for sacrifice to the gods. But Dr. Bernal says it now is clear that "conquest for these people was undertaken for economic and political reasons. This doesn't mean it wasn't also undertaken for religious purposes. It was the god who conquered. But the results were quite practical. . . . "The whole structure of thinking on



Mexican archaeology has changed in the past few years," he adds. "It is wrong to think in terms of simple societies based on family ties and not to consider it to be a true state situation.

"Many areas of the picture are still hazy. What role did Western Mexico play? And Northern Mexico was not involved. It was quite primitive.

"But, in Central, Eastern, and Southern Mexico over the 2000 to 3000 years before Cortés, there were major states. We think of no less than seven or eight major states plus many smaller ones."

#### **Defining Decadence**

In the rise, decline, and interaction of these states, archaeologists hope to learn something relevant to the cultural crises of our own times. John Paddock, American archaeologist at the Museo Frissell de Arte Zapoteca in Mitla, Oaxaca, often thinks of this as he probes the monuments and potsherds of a valley that has been lived in for at least 10,000 years.

"We are trying to define decadence," he says, "just as our society should ask if it is in a period of decadence or transition, so we ask that question about phases of ancient civilizations here. In thinking about America today, we assume its decadence without asking what we mean by it. We should question it. We perhaps can provide some clarification here."

Right now, Professor Paddock is digging out a pyramid-tomb complex, known as Lambityeco, in the middle of the valley. It corresponds to an epoch around 700 A.D. when the valley's culture was in decline.

At one end of the valley, Monté Albán, one of Indian Mexico's magnificent religious centers, covers a plateau with pyramids, temples, courtyards, and other structures. At the other end of the valley, Mitla has been a population center since before 1000 B.C.

Monté Albán's builders began about 700 B.C. For many centuries, the Zapotecs (who still live in the valley) were masters.

Then they lost their verve. After a period of decay, a closely related people, the Mixtecs, moved in to restore cultural dynamism. Lambityeco belongs to the period of decay.

"Look at this awful thing!" Mr. Paddock exclaimed, holding up a badly-made pottery figure. "It's a deity! This is supposed to be the corn god—the staff of life. The black leopard in Woolworth's is better than this! It's a clear case of decadence."

Architecture and other material at the site are equally shoddy. "It was just a bad period, that's all," Mr. Paddock says. "In quantity, they had a lot. They just didn't have quality."

Then the Mixtecs invaded and excellence returned. Basically, Mixtec and Zapotec cultures were similar. But that of the Mixtecs had remained virile. What caused the once powerful Zapotecs to decline? Was this really decline of a culture or merely an adjustment, a transition, within a general culture that embraced both peoples?

Professor Paddock's group, in studying such cultural change and ethnic conflict in a non-European, non-Asian context, may find clues to help us understand society's strains today.

"That's how we hope to have some utility," Mr. Paddock says. "They were people and behaved like people. Hopefully, what we learn will be relevant to what people do elsewhere."

#### **To Study the Past or Build the Future?**

Mexicans, themselves, see their Indian heritage in this light. "Mexican archaeology is part of mankind's history," says Dr. Lorenzo. "So in this worldwide research into man and his development, we are part of it."

At the same time, he's concerned that neither Mexico nor the world is getting the whole picture. He thinks that "the glamour and magnetism of the big sites throws a veil over Mexican archaeology. Look at all the unexplored land between the big sites," he says. "We are jumping big gaps and creating a false picture.

"A research plan that will produce real knowledge of a culture needs a lot of detailed work on many small sites, then a lot of analysis and extensive publication." With some exceptions, this isn't being done in Mexico.

For Mexican scientists, this is a matter of money. Dr. Lorenzo notes that "we can pay attention to the past of Mexico or help build its future. Mexico needs all its money for development. There's little left for archaeology. I am an archaeologist. But I understand. So we are salvaging as much of the past as we can."

The grantsmanship of foreign scientists doesn't help either. You'd think that being free of national development pressures, they could follow long-term plans. But Dr. Lorenzo says they "get lost because of the wonderful richness of objects."

"The research sponsors," he adds, "need things that can be handled. An easy way to get funds is to work in glamorous places. Who is going to give money for long-range research?"

Even so, the work archaeologists are doing has revealed many aspects of the Indian greatness. It fully backs up the challenge which the National Museum of Anthropology gives its visitors.

"Mexican," says the legend over the entrance, "think of yourself in the mirror of this grandeur. Foreigner," it adds, "contemplate here the unity of human destiny."

Robert C. Cowen, '49, is Science Editor of *The Christian Science Monitor* and President of the National Association of Science Writers.

# The Uses of Learning

The idea of free, public, universal education, if not a uniquely American invention, is nevertheless a goal to which Americans and American society have been committed from the earliest days. It is unfortunately true that reality invariably dims the noble glow of words. Let it be granted that not every family has been able to afford to send its children to *free* schools and colleges; that even in principle, *universal* has not always and everywhere included everyone, black, red, and white; and that the nature of public education has often been inconsistent with other social goals. Still, until recently, there has been an almost mystical faith in the value of education in the life of men and its necessity for the preservation of democratic society.

The commitment has been expressed pragmatically. We have been willing to put our pocketbooks where our ideals are. In every state in the country and probably in every town and city, the largest single expenditure is for education, while in the federal budget, education costs are exceeded only by military spending.

But a more profound expression of this faith in education may be seen in certain actions that we can understand only as symbolic statements. The career of James B. Conant is an example. After twenty years as President of Harvard University, he resigned in 1953 to become United States High Commissioner (later Ambassador) in Germany. Returning in 1957 he sought, as the culmination of his professional life, not some high public office, not the presidency of some wealthy, influential enterprise; as is well known, he chose to devote himself to a long-range study of American public high schools, junior high schools and elementary schools. The unexpectedness of the choice, the contrast between what he had done and what he would do, is startling at first. But if we see it as a metaphoric declaration, it explains itself completely, illuminating the man and the situation, as when a playwright has found for his protagonist precisely the right gesture.

On a social, rather than an individual, scale the metaphor is even more

striking. It cannot be considered an inevitable consequence of history and logic that the drive toward civil equality for American Negroes should have begun with attempts to eliminate educational inequities. On the contrary, the 1954 Supreme Court decision dealing with the desegregation of schools is more fully understandable as the symbolic expression of a deep-rooted belief in the transforming force of education. For more than a decade, Presidents, Congresses, and civil rights movements, acting out this belief, passed over the need for economic, political, and social equality, and, until recently, concentrated on equality of educational opportunity.

Now a new trend has become discernible. Civil rights bills are now concerned with job equality, voting equality, equality in housing. At the same time, the public schools in and around the cities are coming to be seen by both black and white communities not as means for regenerating society but rather as new arenas for the power struggle. Among college students, surely not an oppressed group, there is increasing dissatisfaction with the processes and content of their education. And there are intimations in this year's budget cuts, notably in New York City, that education may not continue to have first call on the American pocketbook.

Salvation through education is a fading ideal to which we still avow commitment, but only ritually, in words. We have suffered disappointment because we have expected education to yield certain personal and social goods—better jobs, equality, security, economic development, national power—that are not in the province of education. We have forgotten that education, which is directed toward enabling men to grow to the outermost limits of their potential, is not the same as vocational and other specialized training aimed at inculcating specific skills for limited purposes. In effect, we have never had universal education but only compulsory attendance at schools, from which we have expected outcomes proper to other institutions and environments. We should have known better, of

course. But investigating why and how we acquired such unreasonable expectations is less important than rediscovering the valid uses of learning.

Two books may serve as guides in a return to more fundamental views than those of most professional educators as to the goals and nature of education. In *The Learning Society* by Robert M. Hutchins (New York: Praeger, 142 pp., \$4.50), the approach is by way of society. Paul Weiss, in *The Making of Men* (Carbondale: Southern Illinois University Press, 157 pp., \$4.95), begins with the individual. The authors' paths converge, so that the books support and complement each other, although I think that a meeting between the two men would be like one of those Impossible Interviews in the old *Vanity Fair*. Both books have defects, I am sorry to note, but what they say is important and, if not entirely original, has been unsaid for so long as to constitute a genuine rediscovery.

## A Man in a Hurry

Mr. Hutchins, now at 69 Head of the Center for the Study of Democratic Institutions, has always been in a hurry. He was Dean of the Yale Law School at the age of 29, President of the University of Chicago at 30, and Chancellor at 46. It may not be surprising, therefore, that *The Learning Society* appears to be put together hastily. The syntax of Mr. Hutchins' sentences is often not quite correct. He tends to repeat favorite expressions with minor variations: "Politics is the architectonic science," "Education is the attempt to help people become intelligent." In striving for universality, he sometimes creates the impression of flashiness and superficiality.

And yet, let me emphasize, this is not a bad book, only a badly designed one. The culprit is the person who composed it as if it were—which it is not—an orderly, coherent exposition. If it is read for what it is—a collection of epigrammatic sentences and short notes—then the reader may engage, if he wishes, in a fruitful dialogue, in which he supplies the connecting tissue of fact and reasoning.

Mr. Hutchins' major premise is the educability of every human being. Society must therefore provide universal education, which cannot, however, have a "practical" aim, because such a goal cannot, in practice, be achieved. "The notion that education guarantees a brighter social and economic future for the individual is illusory; the notion that education can lead to understanding, and that understanding is a good in itself, is not," he writes.

He speaks sharply against the attempt to save the world through education, which inevitably "evades the necessity of doing something about the slums. . . Those who talk of education as the sole means of solving the race problem, or of obtaining lasting peace, or of curing juvenile delinquency, often seem to mean that they have not much interest in these subjects. . ."

With some striking illustrations and analogies, he discusses the technology of education, the proper role of vocational training, the responsibilities of universities, the relation between educational changes and the cultural climate; and he concludes with the conviction that education should not end with formal schooling. "The way to stay human is to keep on learning."

#### From Childhood to Maturity

Paul Weiss opens *The Making of Men* with "a child is a child" and ends it with the man grown to maturity, having considered along the way every stage of the educational process. The title is from his statement that "the object of teaching is the making of men." The writing is relatively free of jargon, but perhaps because the author is Professor of Philosophy at Yale, his treatment is sometimes overwhelmingly thorough.

His ideas originate, not in educational theory, but in his lifelong reflections on "the nature of reality and the fundamental concepts which govern thought and action . . . the foundations of ethics and the proper end of man." When, more frequently than might be expected, his conclusions coincide with those of Mr. Hutchins, they are invariably broader and deeper. "College

is the time and place to teach useless subjects. Only useless subjects? Yes, only useless subjects, even if one wanted—indeed, precisely if one wants—to give the student a 'practical' education," Professor Weiss writes. "Education is the art of producing fulfilled men. These are men who have lived up to their promise and who therefore can contribute to and share in the funded wisdom and achievements of mankind."

Professor Weiss is concerned with how men should live in relation to themselves, to other men, and to the world. . . that is, with the nature of the good life and how education should help men to attain it. "It is not the task of the school to prepare the student to lead a life that society endorses or rewards. It is not its function to enable him to be more efficient, more successful, or even better informed. . . Too soon one forgets that the purpose of education is to enable the student to live the best, the richest possible life, then and later."

If we have indeed forgotten the true purpose of education, we are now reminded.

It is time for a fresh commitment.

#### In Brief

*The Evolution of the Machine* by Ritchie Calder (New York: Van Nostrand, 160 pp., \$4.95) is a joint enterprise of American Heritage and the Smithsonian Institution. The book is so generously illustrated with photographs and drawings, many in color and some on special paper, that picture-browsing alone yields a summary overview of the development of technology. Mr. Calder, the noted British science writer, has provided a readable, though highly compressed, historical account.

Roger Tory Peterson's classic, *A Field Guide to the Birds*, has been issued in paper back (Boston: Houghton Mifflin, 290 pp., \$2.95). Dedicated birdwatchers surely know the book, which gives the "field marks of all species found east of the Rockies." Even those whose bird watching is

confined to their back yards, however, will find the book's sensible organization and hundreds of illustrations useful as well as interesting.

With Margaret McKenney, Mr. Peterson has written and he has illustrated, *A Field Guide to Wildflowers* (Boston: Houghton Mifflin, 420 pp., \$4.95) covering Northeastern and North Central North America. The book is planned for those who identify plants by matching pictures. As in other flower guides, the breakdown is by color. This book is not only more complete than most and more copiously illustrated, but analysis is carried beyond color to general shapes of plants and other visual distinctions. Flower seekers are now as well served as bird watchers.

#### New from the M.I.T. Community

*The Most Probable World*, Stuart Chase, '10. New York, Evanston and London: Harper and Row, \$5.95. The achievements and hazards of science and technology stand behind the social, political and scientific problems which man must solve before the Twenty-First Century. His choice is between freedom from drudgery, sickness, famine and armed conflict and the destructiveness which could render the earth a wilderness.

*Yawelmani Phonology*, Sige-Yuki Kuroda, Ph.D. '65. Cambridge: The M.I.T. Press, \$10.00. A technical reorganization on the basis of recent developments in generative phonology of the phonological description of the Yawelmani language, one of six dialects of Japanese.

Joseph Mindel is a member of the M.I.T. Lincoln Laboratory. He was formerly a teacher, department head, and administrator of science education in the New York City secondary schools. He has written on science education and the history of science and is the author of many radio and television plays. The notes "New from the M.I.T. Community" have been prepared by the editors of *Technology Review*.



For the past several years, MIT has offered courses consisting of interdepartmental student projects in systems engineering. Each project unites 40 seniors and graduate students of various disciplines and interests, guided but not restrained by faculty members and invited speakers. For each new course a large-scale problem on the outer limits of technology is assigned, and the students develop all its interlocking aspects from beginning to end, concurrently fitting differing technologies into a design, a schedule, and a budget, optimizing each phase and component of the project in terms of over-all system performance. Finally, they summarize their results and recommendations in a report written by the students themselves and published by The MIT Press.

In these reports, real-life problems are confronted head on—the students either “make do” with existing techniques and hardware or develop new techniques and hardware that really work; they plan within actual political and economic constraints; and, in order to make reality more habitable, they strive to incorporate maximum social and esthetic values.

Three project reports have already been published, and two more will follow later this year. All are paperbound and measure seven by ten inches or larger. Order from your book store or from **The MIT Press** 50 Ames Street Cambridge, Massachusetts 02142

# STUDENTS TAKE CHARGE

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**The challenge:** In Megalopolis—the congested corridor stretching from Boston to Washington—it is already difficult to get from one core city to another. By 1980 it will be twice as difficult. How do we get moving again?  
**The projected solution:** A system of air-supported, electrically propelled vehicles operating at 350 mph. In order to insure flexibility and minimize door-to-door travel time, the system employs small-capacity vehicles and automobile carriers as well as larger, bus-like vehicles.

**Project Metran**  
1967 \$7.50

**The challenge:** Getting around *within* a city is burning up an increasing amount of time and patience. Where do we go from here?  
**The projected solution:** Auto-like modules that can be driven conventionally but can also be hooked onto automated guideways in which a central computer controls and optimizes the speed and the route of every vehicle. This arrangement will lessen total travel time, greatly reduce the accident rate, and contribute materially to solving the problem of air pollution.

**Project Nero**  
1967 \$7.50

**The challenge:** Accidents can happen in space, too, and have. Is it possible to rescue astronauts whose craft is in distress?  
**The projected solution:** A kind of “Coast Guard” for astronauts, designed to provide both emergency aid and everyday service. Based on present-day engineering techniques and propulsion systems, the project could be made operational by the early 1970’s and could handle a number of missions, including rescue, delivery of supplies, recovery, repair, and inspection of unmanned satellites, and scavenging of inert debris.

To Be Published Later in 1968

**Project Romulus**  
1968 \$10.00

**The challenge:** How do you house an expanding urban population without expanding suburbia beyond the reach of the central city and without excessive demolition of existing housing?  
**The projected solution:** Launch an island city—in the case studied here, one built on islands now existing or to be created in Boston harbor. The city planned is nearly self-contained, providing housing, transportation, and amenities for 70,000 residents, and employment for many of them.

**Project Icarus**  
1968 \$10.00

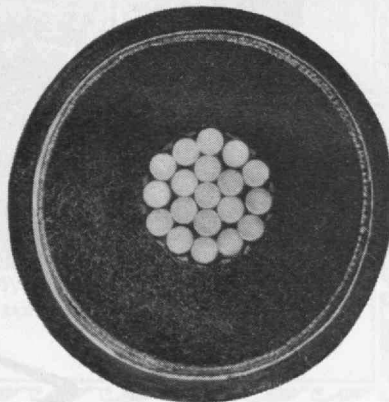
**The challenge:** The asteroid Icarus makes its nearest approach to the earth in June of this year. Although improbable, it *could* make a direct hit, with catastrophic result. Can anything be done?  
**The projected solution:** Destroy it or deflect it into a noncollision-course orbit by means of hydrogen bombs. Since time is so short, only rockets and warheads already in existence and tested can be included in the plan. *This, by the way, is the month: June 1968. Icarus is a real asteroid.*



## on guard

This is an enlarged photograph of the end of a pencil. Graphite is ideal for writing (its name even means "to write"), but it is soft and needs protection. Hence the invention of the pencil. Because of man's propensity for making mistakes, no pencil is considered complete without an added invention—the eraser.

Below is a cross-section of a cable. Copper is an ideal carrier, but it needs protection. Hence the invention of Kerite. Nobody has ever made a mistake in specifying Kerite; it has been proved in service for 40, 50, even 60 years. A Kerite cable does not call for erasers. The Kerite Company, 30 Church St., New York, N. Y. 10007.



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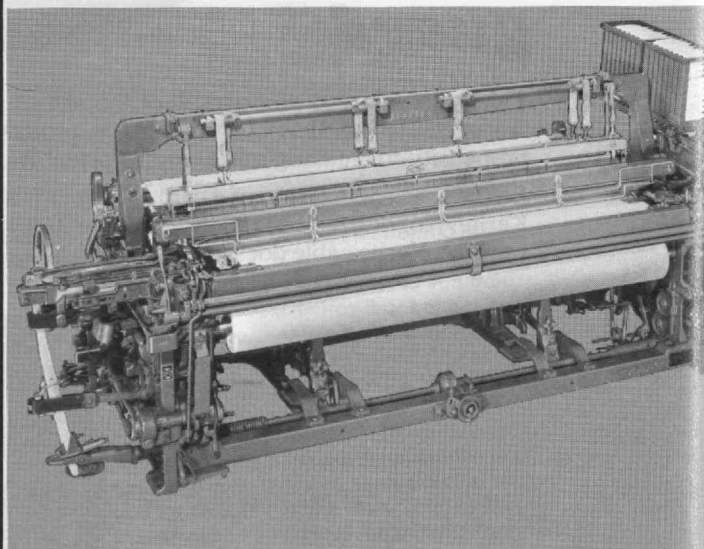
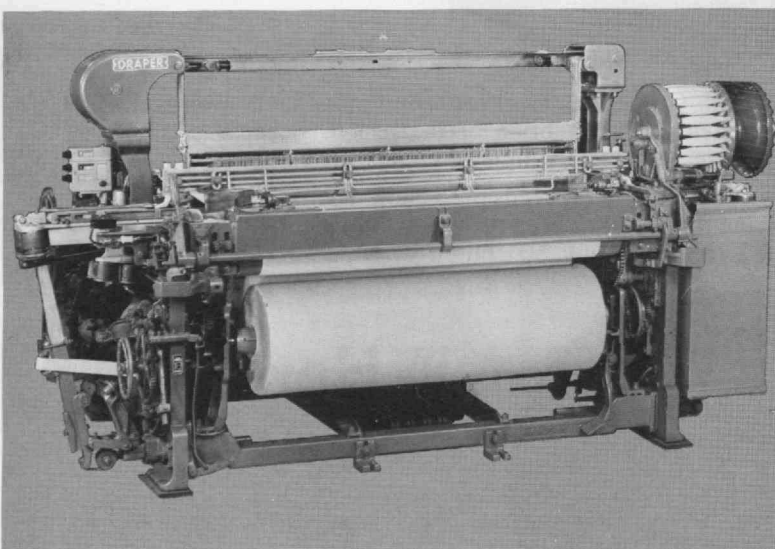
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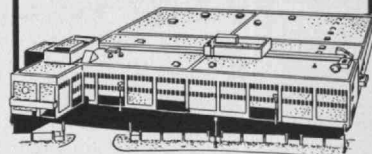
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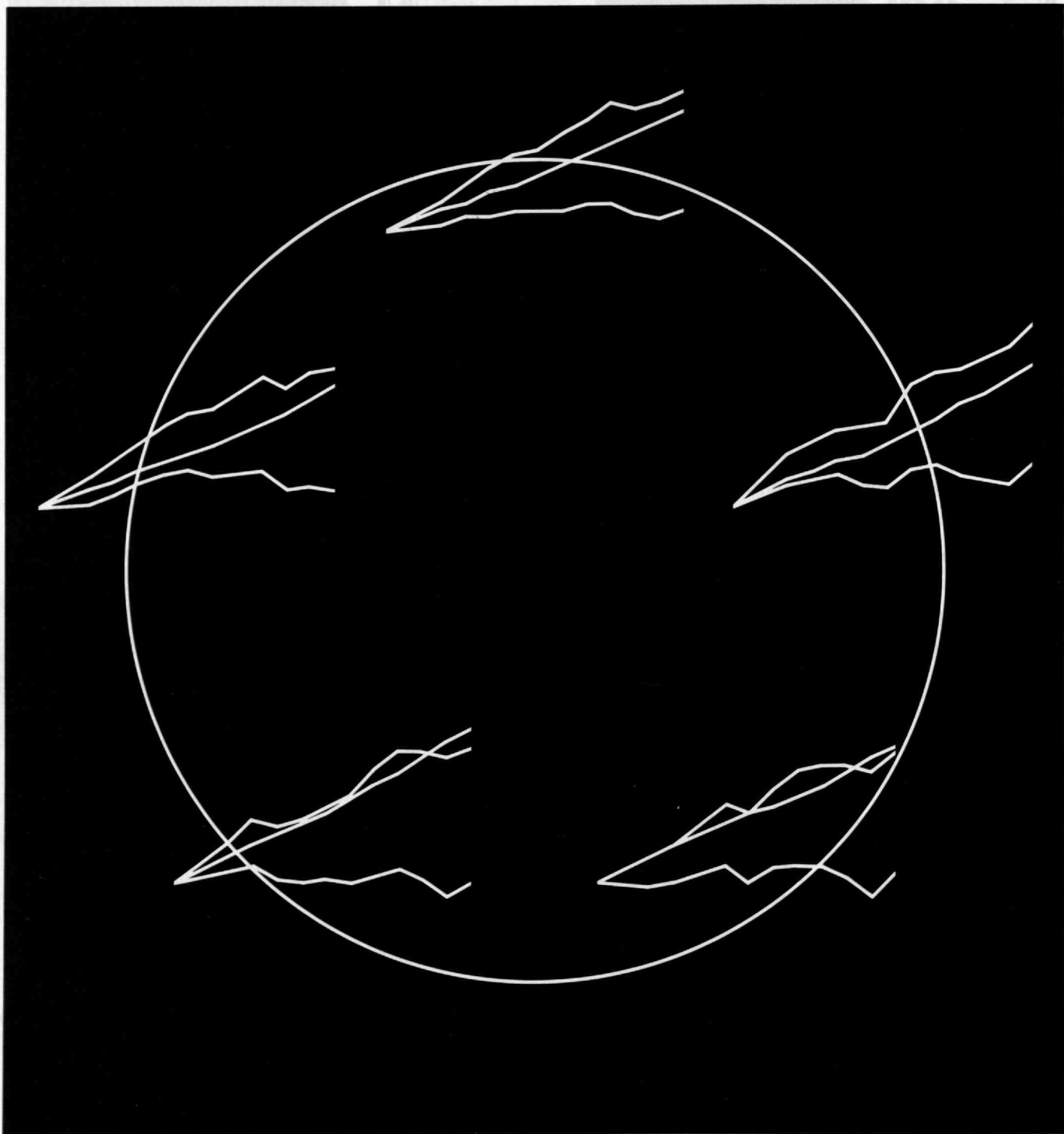
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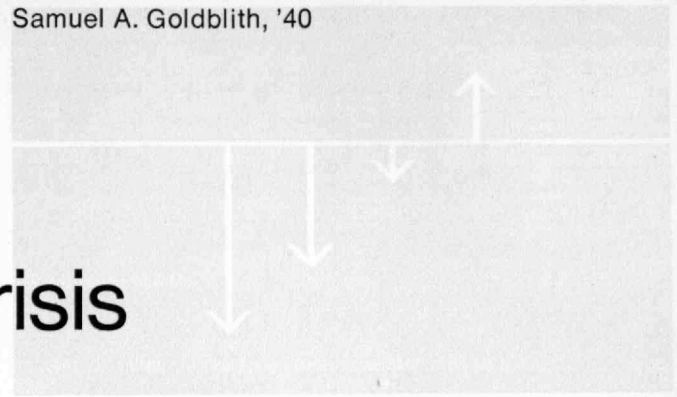
In the world's less developed regions, food production—though rising—is barely keeping pace with the rapid population growth. The chart shows the percentage increases in population and food supplies—and the relatively constant per capita food production—since 1956. The data are given for all developing nations (top), and for (clockwise) the Near East, Africa, Latin America, and the Far East. In Latin America and the Far East, per capita food production has actually decreased in the last decade. (Data: Food and Agriculture Organization)





The crisis is upon us now; technology can do much to help overcome it, but only in concert with social science and business management

Samuel A. Goldblith, '40



# The World Food Crisis

It has been the hope and aspiration of man since the age of enlightenment that, as he advanced in knowledge, small increments of insight might lead to inventions; and that, as he broadened his horizons, this knowledge and the discoveries it stimulated, would become available to all humanity. But so far the advances of science and technology have been used predominantly by the Western world—which developed that knowledge. This has produced an ever-widening gap in total economic development between the developed world and the Less Developed Countries (L.D.C.'s).

The tremendous contrast between the wealth of Western civilization and the poverty of much of the remainder of the world shows up dramatically in per capita incomes, which vary from over \$2,650 per year in the United States to under \$100 in such countries as India, Burma and Nepal. Among the L.D.C.'s per capita income rose from \$88 in 1951 to only \$98 in 1961, whereas during the same period Western Europe showed a rise of \$27.50 and the U.S.A. an increase of \$225.

The hunger that is endemic today throughout the underdeveloped world is not the basic disease but a symptom of the lack of total economic development in the L.D.C.'s. Nevertheless, the hunger is very real. But now some hope for the hungry is emerging from laboratories of food science in the form of unconventional new methods of producing food. In this article, I intend to attempt a realistic assessment of the problem and an appraisal of the probable roles of new technologies and unconventional food sources in attacking it.

## Slavery of Starvation . . .

Since World War II the peoples of the L.D.C.'s have realized a degree of political freedom never before achieved. However, this has not been matched by a parallel growth in welfare. And in the crises of starvation, poor housing and insufficient clothing the political freedom loses much of its meaning. Starvation initiates politico-economic crises which threaten the very foundations of democratic in-

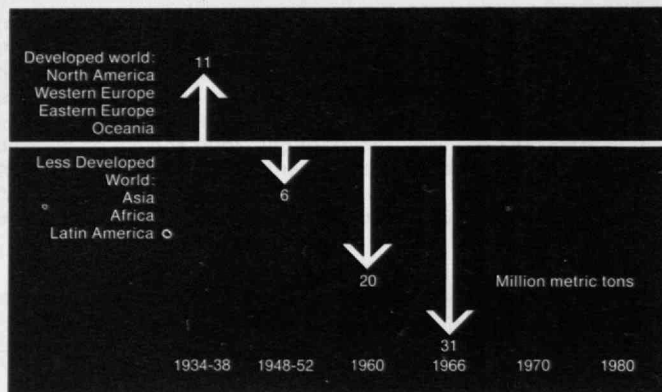
stitutions not only in the emerging nations but indeed throughout the free world.

Convincing data are at hand to demonstrate that many of the expanding areas of the world are suffering from both total lack of calories and protein deficiency disease. The U.N. Food and Agriculture Organization estimates that about 20 per cent of the inhabitants of developing areas in the world have insufficient calories for their needs while about 60 per cent are malnourished (that is, short of proteins). Thus the specter of malnutrition in the L.D.C.'s may be described in a nutshell as a deficiency of calories and good quality protein.

Many commentators talk and write about impending crises in 1980, while, in reality, the crisis is already here today. Two of the symptoms are plain to see: food riots and the mental effects of malnutrition. Food riots are actually occurring now, in 1968, particularly in the big cities of India and other L.D.C.'s. Many of these countries face the grim and ugly specter of mass starvation, but long before this appears we shall witness the more dismal failure and collapse of organized civil societies as we know them, particularly in the big cities.

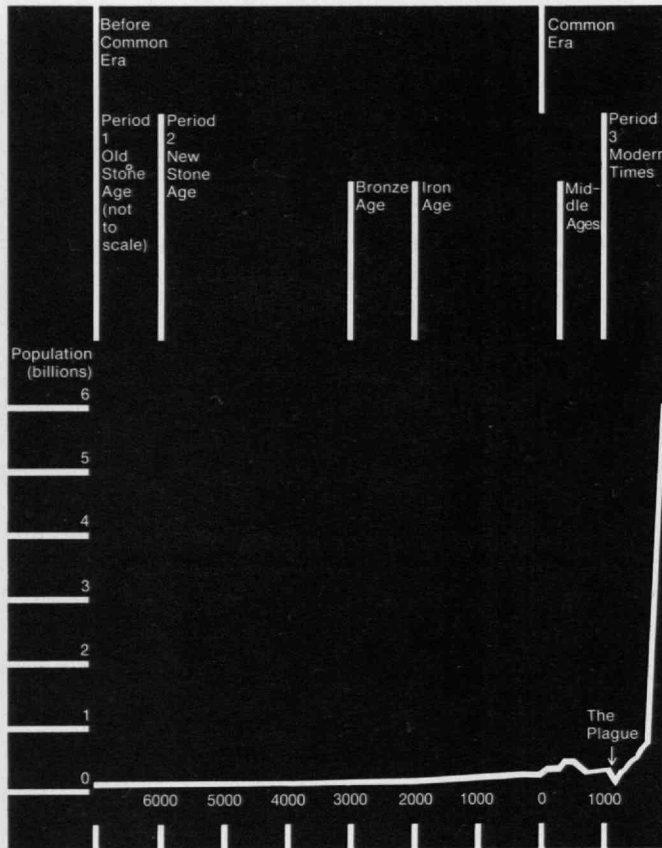
Recent evidence has fairly conclusively demonstrated that malnutrition can cause irrevocable mental damage in preschool children (see *Technology Review*, May, 1967, p. 23). Children in many L.D.C.'s just weaned from the mother's breast are normally fed a gruel diet low in protein at a time when their protein needs are the highest. This lack of adequate diet not only retards their physical growth and development but also impairs their mental development. Thus, malnutrition today casts its ugly shadow on society a generation hence.

The catastrophic effects of malnutrition in preschool children is shown by the relative death rates of children between one and four years old. In the L.D.C.'s it averages 35 per 1,000; in the developed countries, 1 per 1,000. The mental and physical damage suffered by those who survive



Flow of grain between developed and less developed countries has reversed in recent years, as population of the latter has exploded. No longer are the less developed countries net exporters of grain: they need all they can produce, and more, to feed their hungry millions.

Burgeoning population has followed advances of modern medicine, which have greatly lengthened the human life-span. Today the world contains over three billion people. At present rates of growth, this number could reach seven billion by the year 2000. By then, the less developed countries, which cannot produce enough food for their present populations, may have to support over five billion people. And throughout the world, the rapid progress of urbanization is adding to the numbers of people dependent on others for food.



burgeoning rates of population increase. For the period 1950 to 1965 the annual growth rates of population were 1.2 per cent for the developed countries and 2.1 for the L.D.C.'s. Projected ranges of population for the year 2000 suggest that the L.D.C.'s will contain 4.204 to 5.478 billion inhabitants against 1.245 to 1.516 billion in the developed regions.

For years, communicable diseases, such as the black plague which swept over Europe in the Fourteenth Century, provided effective methods of population control. Now the remarkable medical discoveries of the Nineteenth and Twentieth Centuries have resulted in a much lower infant mortality rate and a longer human lifespan. More people are living to childbearing age, and as a result, more people are having children.

Thus, when we look at total economic development and at population dynamics, we begin to see the paradox. Science and technology have resulted in rates of total economic development which far exceed needs in Western civilization, making these countries ever richer, whereas population growth results in economic needs which far outweigh the generative capacity of the L.D.C.'s, thus making the poor nations even poorer. Until recent years, the growth of a society's population was identified with prosperity and strength; today the opposite has become true.

### Food, Family Planning and Economics

Global surveys on a per capita basis suggest that there is no worldwide shortage of food either in terms of quantity (calories) or quality (protein). Nevertheless, in the L.D.C.'s, which contain two thirds of the world's population, there is overwhelming clinical evidence of undernutrition and malnutrition. Thus the basic problem is uneven distribution of food, not only among countries but also among families with different income levels in a given country. As the level of income goes down, a greater percentage of the total calories comes in the form of carbohydrate, with a corresponding decrease in protein.

these immediate handicaps is more than sufficient to handicap the society of 1985 in the L.D.C.'s.

### ... in a Burgeoning Population

In recent times the rate of births in the world has transformed from a simple arithmetic exercise to a complicated geometric progression (see figure above). The number of years the world's population takes to double itself has been continually decreasing. Man took many millennia to reproduce himself to a population of one billion by 1850. By 1925 he had reached the two-billion level. He attained the third billion in only 35 years. If present trends continue (and we are now so biologically committed), we shall have a fourth billion by 1980 and a fifth by 1990.

An important factor in the equation of population and hunger is the geographical distribution of the

If the world's population continues to increase at 1965 rates, its demand for calories will have increased by 52 per cent by 1985. A President's Science Advisory Committee Panel last year pointed out that "if, as a result of family planning programs during 1965-1985, one optimistically assumes a progressive decrease to 30 per cent in the probability that a woman of given age will bear a child, the calorie requirements will be 43 per cent higher." In the developing countries, the problem is worse; India's population at its present rate of increase would need 108 per cent more calories by 1985. Even a 30 per cent reduction in fertility will only bring this figure down to 88 per cent. The P.S.A.C. Panel cited similar figures for Pakistan and Brazil.

Family planning alone cannot solve the problem of the next 20 years. Nevertheless, without it the entire situation becomes utterly hopeless, for the impact of successful planning is cumulative and makes itself felt in succeeding generations. Solution of the problem that will exist after 1985 demands initiation of population control now. For the immediate future, food supply is the critical factor. In the long term both approaches are imperative.

The P.S.A.C. Panel estimated that the 4.0 per cent increase in food supply necessary to satisfy the demand will require an increase in capital investments from the current 15 per cent to 19 per cent of the G.N.P. of the developing countries. This is equivalent to a \$12 billion increase in investment above the 1965 base. Thus the capital and technical involvement of both developed and less developed countries will be required on a scale never before imagined. The task is too great for the resources of the U.S.A. alone; it demands a global effort, with the U.S. taking the lead. And even such a wide-ranging crusade will not solve the problem in a year or a decade: it will probably take three-quarters of a century of concerted effort in the form of capital, know-how and technical assistance—and part of the competence needed is management skill.

How, then, should we set about this vast task? First, we must initiate population control in the L.D.C.'s now if we are to have even a chance to meet the challenge of the year 2000. This is the *sine qua non*. While a foolproof method of introducing birth control to the L.D.C.'s is not yet in sight, we do have the basic foundations from which to achieve it. These are development of national policy, demonstrated public interest in population control, improvement in contraceptive technology and the established governmental programs on birth control in practice among several Oriental populations. Implementation of a population control problem, without which there is no hope of solving the world food problem,

demands immediate funding by the developed nations. While the magnitude of this assistance, per se, is large, in terms of requirements for economic development it is relatively small.

### **The Dominant Role of Conventional Agriculture**

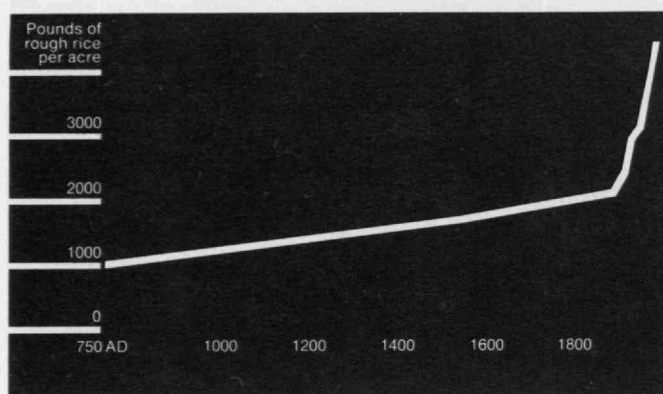
We can focus easily on the role of conventional agriculture by considering the following points: Firstly, the scale and severity of the problem are so great that they demand every possible source of foodstuff and every ingenious innovation the mind of man can create, through science, technology and engineering. Secondly, through its direct relation to agricultural development, the food problem is totally entwined with over-all development in the L.D.C.'s. Thirdly, man now obtains the bulk of his calorific and protein needs from conventional agriculture, and he probably will continue to do so in the future. And fourthly—a very important consideration—successful family planning programs will have no effect on the world's population for the next generation. We are biologically committed to an additional billion souls in the world some 15 years hence. Eight hundred thousand of these will be born in the L.D.C.'s, which have insufficient food to sustain their present population. Thus the immediate need in the next 20 years, just to stay even, is simple to state: grow more food!

The rapid increase in population over the past decade has increased demand for food to such an extent that our grain-stock carryover has fallen at an average rate of 14 million tons per year. Department of Agriculture statistics show that, for wheat alone, the carryover dropped from 1,411 million bushels in 1961 to an estimated 536 million bushels in 1966—the lowest it has been in more than 15 years. Thus, the U.S.A. cannot continue to feed the recipients of these foodstuffs *ad infinitum*. Even worse, the L.D.C.'s, who once exported grain, have slowly become net importers; today they import some 31 million tons annually.

Approximately half of man's total dietary protein comes from cereal grains, and in the less de-



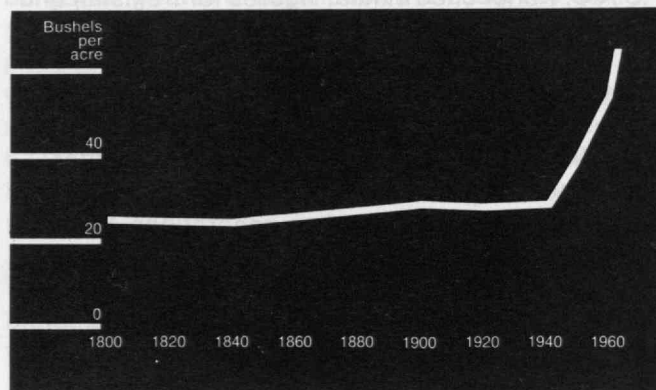
Dramatic increases in yields of rice in Japan during this century (left) and of corn in the United States in the last quarter century (right) arose directly from improved use of land. The amount of good virgin land available today is very limited; developing countries must therefore follow these two examples and increase their agricultural efficiency. (Data: L. R. Brown, in *Science*)



Developed countries cereals contribute nearly 80 per cent of the calories. Obviously any method of providing more cereal or improving the protein quality of cereals will have a direct impact on the 1.8 billion people who today depend mainly on cereal grains as the main source of their calories and protein.

A first attack on the food problem, therefore, must take the form of rapid increases in the amounts of cereals grown in the L.D.C.'s. In general there are two ways of increasing agricultural productivity. Throughout most of history increases in food production have come mainly from increasing the cultivated areas of the world. But today, geographical expansion is becoming too costly, and since about 1950 most of the increases in agricultural production have come about through increasing the yields per acre.

About three billion acres of the world are now under cultivation, and estimates of the possibilities of expanding this range from a few hundred million acres to several billion—but at a cost. Even in the U. S. land farmed a few decades ago has been abandoned because it is no longer profitable to continue. And India, which has the greatest need for more agricultural productivity, is planning only a 2 per cent increase in cultivated area over the period 1966 to 1971, during which food demand is expected to increase by 20 per cent. Moreover, many areas such as the Middle East and North



Africa need to develop new sources of water for irrigation.

Thus, major emphasis must be placed on increasing productivity per unit of land, an approach that has already proved successful in Japan and the U. S. (see figures above). The critical factors in optimizing agricultural yields include provision of adequate water, pest control, improved farming practices, mechanization, development of adequate road networks, plant nutrition, genetics and fertilizers. Implicit in this is training of personnel to understand and use the tools that research makes available, and to adapt them to local situations.

These potentialities for increases in agricultural productivity encompass a great deal. Lack of any one of the necessary inputs could seriously impair the potentiality of meeting the world's food needs. Conventional agriculture can provide the key to the problem of producing sufficient food to feed the L.D.C.'s growing populations if we are but willing to provide the long term aid to make possible all the inputs necessary to increase the crop yields per acre. These countries must set up agricultural development as national goals, and aim to provide the relevant research, education and extension programs to adapt the principles of plant and animal production to local conditions.

This long-term economic aid does not preclude

short-term help, in the form of food aid administered to stimulate agricultural development and improve the food-producing capability of the target nations. Such aid must serve as "seed" money and have a "multiplier" effect, and must be undertaken in concert with local business. It should provide maximum incentives to the developing countries to increase production by investing in their own agriculture; and we as a nation should insist that the recipients give concrete evidence of self-help.

One unnecessary source of loss of food in the L.D.C.'s is that destroyed by rodents, insects, microorganisms and other pests, and spoilage. In some areas this loss can amount to as much as 30 per cent of production. The P.S.A.C. report estimated that if only half of the estimated world loss of food grains were prevented, it would render 55 million tons of food—enough to make the diets of 500 million people in the L.D.C.'s adequate in total calories. Once again, the key to solution of this aspect of the problem is education, particularly of the farmer, to apply known technology and adapt it to local situations.

### Improving Protein Content of Cereals

Since they form such a large proportion of man's food supply, cereals form the obvious first target for improvement of protein content. If this can be achieved by means which do not change the food habits of a population, such improved cereals could be introduced immediately to the hungry. One potential method of this nature is fortification of cereals with amino acids, but at least initially this would be limited to cereal grains which are centrally milled (in contrast to home milling).

Laboratory studies with animals have shown that it is possible to fortify cereals cheaply and effectively with the amino acids, particularly lysine, that they lack. Food scientists are now asking whether this treatment will also improve the nutritional value for humans. For "formed" grains, such as rice, wheat and corn, only amino acids can be used, but for flour, protein supplements as well as the amino acids can be added to a certain level, thus improving the "protein impact" of the cereal.

The U.S. Department of Agriculture is currently starting large pilot studies with recipient countries such as India and Tunisia to determine whether fortification with one amino acid—lysine—does improve the nutritional value of cereal grains. Obviously, if it does, all cereal grains being shipped under the Food for Peace Program should then be fortified, either before shipment or in central distribution warehouses in the recipient countries.

A more direct method of introducing the correct balance of amino acids into cereals arises from

Typical protein contents of various major foodstuffs. The table illustrates the low protein content of certain foods which are central in the diet of some L.D.C.'s. If the diet provides less than 4 per cent of its energy as protein, the subject's appetite will limit his consumption before he has obtained adequate protein. One direction of attack on the world food problem is improvement of the protein quality of cereals by fortification or genetic means. (Data: H. N. Munro)

Foodstuff	Protein content as:	
	Grams per 100 grams edible portion	Percentage of total energy content of food
Cassava flour	1.5	1.8
Plantains	1.0	3.1
Irish potatoes	2.0	10.7
Milk	3.3	20.6
Wheat flour (70% extract)	10.0	11.4
Fish, lean	19.0	37.6
Soybean seed	35.0	36.6
Rice, polished	7.0	8.0
Maize meal (86% extract)	9.5	10.5

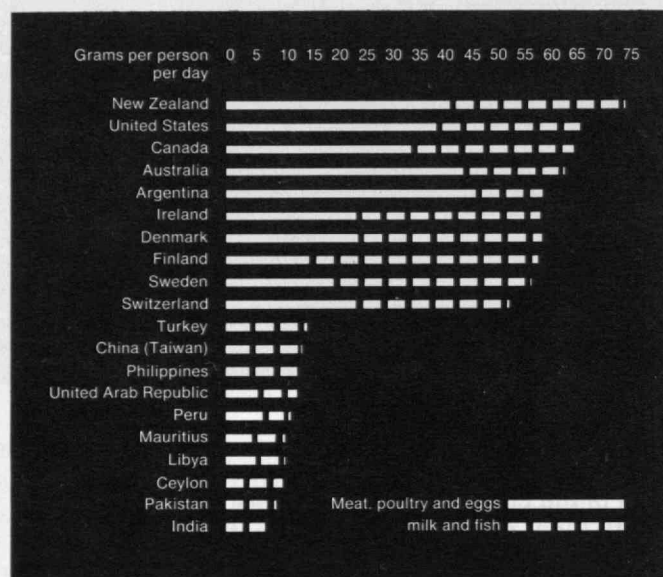
genetic improvements in the grains (although selection of the correct environment also plays a large part). Plant geneticists have recently developed Opaque-2 corn which has a much better amino acid pattern than conventional maize and which, when development is completed, will offer a corn with a protein quality equal to that of animal protein. Feeding studies at the Institute of Nutrition of Central America and Panama (INCAP) have proved the corn to be outstandingly successful. Similar genetic potentials exist for other cereal grains, although their development demands trained people and money. And time will be needed to achieve the nutritional characteristics with the necessary qualities of disease resistance, yield volume, and growth character. The method offers the ultimate cost advantage of allowing nature to build in the limiting amino acids without the logistic and mechanical problems of fortification.

### Conventional Animal Protein

Animal protein represents the ideal protein for human nourishment, as it contains the essential amino acids in near optimal amounts. Unfortunately, animal protein is distributed very unevenly in the world: in developing countries the per capita supply is only nine grams per day, by contrast with 44 grams per capita per day in the developed countries.

In fact, the conversion by animals of the protein in

Animal protein, alone among "natural" protein sources, contains the correct balance of amino acids for human nourishment. However, such protein is distributed very unevenly between the developed and the less developed parts of the world. Advances in nonagricultural production of protein sources may eventually help to alleviate this imbalance, and hold the specter of malnutrition at bay. (Data: P.S.A.C. report on the World Food Problem)



animal feed into protein-containing human food is an inherently inefficient process. The main value of animals in this process is in converting inedible products, such as grasses and other forages, into products desirable to man; indeed, this facet is the only economic justification of animal protein. However, animal protein remains one of the most important sources of protein today, particularly in the developed world for reasons other than economic, and as the economic picture improves in the L.D.C.'s these countries also will demand more animal protein. Such demands will require evaluation in terms of satisfying the demand and using the available land and feed to a maximum, while at the same time providing for improvement in the "quality" of life itself in these areas.

### Unconventional Animal Protein

One generalized source of animal protein not readily appreciated is the group of mammals, both land and aquatic, which are not considered in normal livestock production. These include the wild game mammals such as zebra, wildebeest, impala and others; some of these, notably the eland, can even be domesticated and utilized for food. As Lord Ritchie-Calder stated at the Symposium on the

Future of the Life Sciences at M.I.T. in 1965, "The hippopotamus is a large hunk of edible pork."

Game ranching in Africa, particularly, could provide significant quantities of animal protein, as well as starting up a new industry. Some beginnings have been made in this direction in Southern Rhodesia, South Africa and Eastern and Western Africa. In the U.S.S.R. the saiga antelope, which tastes like mutton, is hunted for its meat and its hide. Since 1957 the Astrakhan Hunting Department has been killing 120,000 to 150,000 saiga per year, to produce 6,000 tons of first-class meat.

Other unusual sources of animal protein include the giant African snail, the largest living land mollusc, which has a fully expanded foot up to 12 inches long. Two of these snails alone would provide up to 25 grams of protein—about half the daily per capita ration of protein in Ghana.

### Food from the Waters

While land animals represent resources whose limits we can at least estimate, the exact fishery potential available in the oceans is unknown. Undoubtedly it considerably exceeds the 1964 harvest of 56 million tons, since only a few of the 20,000 to 25,000 species are currently being harvested and used by man. To achieve even part of the food potential available in the oceans will require, as will other attacks on the food problem, a great deal of money for equipment and training. In addition, fishing areas other than the North Atlantic must be investigated and opened up. There is no doubt that the annual fishery catch can be greatly increased, by catching new species and accepting them as regular parts of human diet, and by developing new methods which will eventually change fishing from hunting and capturing to herding and cultivating.

Another important source, which we can probably expand greatly at lower cost, relates to inland fisheries, such as pond cultures, rivers, streams, lakes and mixed rice paddy fish cultures. These have the advantage that they can be built in the area of consumption, minimizing the processing needs. With relatively low costs for fertilization and feed, yields can be improved tremendously, and with an increase in pond acreage (at \$500 per acre), the present annual yields of 15 million metric tons can be almost tripled. This would require about 15 million additional acres by the year 2000.

A more controversial aspect of food derived from fish is fish protein concentrate, the high-protein powder food obtained from whole fish. F.P.C. of high quality can now be made on a small scale, and we have every reason to assume that this production can be scaled up to commercial quantities.



Conversion of animal feed to human food by animals is an inherently inefficient process. Animals can play an important role in converting inedible grasses and other products into desirable food and in utilizing non-arable land; however, they should not be used to channel synthetic food to human use. (Data: P.S.A.C. report)

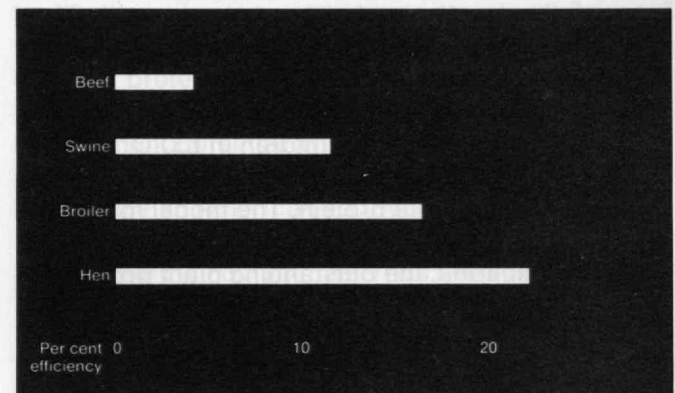
Scaling-up will require an immediate investment in plants, boats and dock facilities as well as training programs for crews, amounting to over \$6 million per megaration (defined as a year's supply of daily 20-gram portions of pure protein, in the form of F.P.C. containing 80 per cent protein, for a million people). Although much research remains, F.P.C. could represent an important stable source of high quality protein. It could be mixed in flour to fortify breads; eventually research may come up with a production method to make possible spinning F.P.C. like cotton or soy fiber.

### The Advent of Nonconventional Foods

Mention of cotton and soy fiber takes us truly into the realm of artificial or nonconventional foods, and it is here, perhaps, that science and technology has most to offer to the solution of the world food problem. Developments over the last decade have given us the ability to isolate and spin soya protein, thus tailor-making meatlike textures in products such as oilseeds, and in the future possibly F.P.C. and protein from petroleum. The process introduces the chewiness and texture of meatlike products, and even meatlike flavors.

Spun foods currently under test derive mainly from the oilseed meals—soybeans, cotton and peanuts. All three contain high proportions of protein. The soybean has long served as the meat, cheese, bread and oil to the people of Asia, and in recent years has become such an important commercial crop in the United States that we may be the world's largest producer. While people in the Far East use soybeans for human consumption, we in the Western world use the meal, after removing the oil, for animal feed. Clearly we could aid the hungry world by exporting more of our soybean production for direct human feeding; however, if we do, we must also find other protein feed sources for the immense livestock industry, as we have hardly any soybean carryover in this country.

The world's production of cotton has not been increasing as rapidly as that of other sources of



oilseeds, mainly because the textile industry is increasingly using synthetic fibers. Unless new uses are found for cotton fibers, this situation will not improve. In nutritional terms, cottonseed has the disadvantage of containing a substance toxic to man, known as gossypol, which must be removed, destroyed or inactivated before human consumption. However, scientists are now attempting to develop a new variety of glandless cottonseed which is low in gossypol.

Peanuts are important both as protein sources and for oil and, like cotton, are indigenous to the protein-poor tropical areas of the world. Under poor conditions of storage, mold growth on peanuts sometimes produces a very poisonous mycotoxin (see *Technology Review*, Mar., 1967, p. 22). Research is now underway to find means of removing this substance from peanuts.

All in all, oilseeds offer great potential for fulfilling some of the world's protein needs. The P.S.A.C. report on World Food Supply pointed out that: "... based on a reported U.S. production of 626 million bushels of soybeans, each additional 1 per cent increase in production would yield 30.3 thousand metric tons of oil and 61.5 thousand metric tons of protein, or enough protein to correct the lysine deficiency of 1.0 million metric tons of wheat." Such an increase in the United States would probably require price support, because yields per acre and probably cash return to the

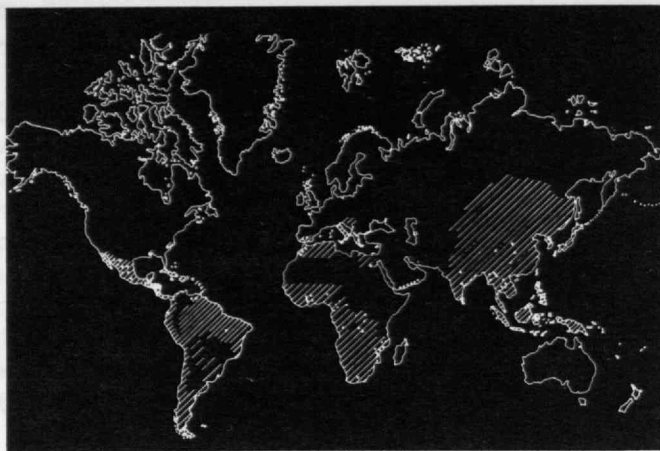
Endemic malnutrition occurs primarily in the tropical and subtropical areas of the world (shaded). Potentially, these areas can support both agricultural and nonagricultural production of food. Application of science and technology, in harness with social science, can prevent these regions from falling into the throes of starvation, but the cost, in terms of economic investment, is great, and the need immediate.

is the World Food Problem?

farmer fall below those of alternate crops such as corn.

An important application of oilseeds occurs in protein-rich beverages for children in L.D.C.'s just weaned from the mother's breast, who desperately require adequate protein. The model for such beverages has been powdered concentrates, especially Incaparina, the outstanding plant protein food pioneered by Dr. Nevin S. Scrimshaw, now Head of M.I.T.'s Department of Nutrition and Food Science, when he was Director of I.N.C.A.P. Another typical example is the Vita soy drink in Hong Kong which has proved a great marketing success. And last year the Agency for International Development established a program to develop new foods for the developing countries, and is now working on protein beverages and foods for El Salvador, Brazil and Tunisia.

A recent entry to the field of nonagricultural food has been single-cell protein (S.C.P.) produced from yeasts or bacteria on various substrates, particularly the hydrocarbons from petroleum (see *Technology Review*, Dec., 1967, p. 46). Its greatest advantage is that it can be produced on a large scale independently of agriculture or climatic conditions. Oil companies, in some cases in concert with food companies, are pouring large amounts of money into research on S.C.P.; however, much research remains in such fields as making S.C.P. soluble or "spinnable," obtaining sufficient information on its chemical and biochemical properties to allow governmental regulatory bodies to evaluate it for clearance, and optimizing yields. This calls for substantial research programs now, to ensure sufficient progress to give the food a reasonable impact by 1975 or 1980. Many food scientists feel that, in view of the relative inefficiency of feeding protein to humans via animals, they should aim to produce S.C.P. for human consumption rather than animal feed, since the requirements for clearance by the regulatory authorities, at least in this country, are the same in both cases.



### Science, Technology and Society

At the beginning of this article I pointed out that the advances made by science and technology have been exploited mainly by the Western world. Indeed, science has become the dominant factor in our developed society. Scientifically based technology has produced the important determinants of today's and tomorrow's society—the corfam on our feet, the nylon on our backs, the televisions in our living rooms and the dinners in our freezers. This development of science and technology offers hope that the transformation from a nomadic to a technological existence, which once took centuries to achieve, can theoretically take place within a single generation in today's world. But can this be done? Can the less developed societies accept such a rapid rate of change?

Social problems have arisen from technological conquests since the industrial revolution. Watt's steam engine outmoded a society based on agriculture. Henry Ford's Model T altered all our concepts of transportation. Both changed the old fabric of society and created new ways of life. And today the jet, nuclear power and rockets are doing just the same, producing an impact on our society that is just as great, if not greater.

Many people—well-educated people in Western civilization—do not always respond in their customs, attitudes and adjustment to the changing environment that rapid advances in science and technology produce. Humans just do not adapt rapidly to changes in environment. Social science, to benefit from technological change, must respond favorably and quickly—but often fails to do so. We must remember this when we consider some of the possible approaches to the world food problem, particularly those based on new technology. Science can produce positive changes; but man, in order to use the changes, must be able to modify his habits rapidly and frequently, especially as the rates of scientific developments increase. Clearly, the L.D.C.'s will require education at all levels before they can begin to exploit

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the potential that rapid advances in science and technology make available.

The answer to this problem of mingling social attitudes and physical accomplishments probably lies in two areas. Firstly, we must recognize that attempting to change societal habits does present a real problem. Man is a conservative animal. Changes in habits, customs, attitudes and institutions evolve only very slowly. Human adaptability, particularly in the less developed areas of the world, is not great. Recognizing this, we must devote more and more attention to the human factor; we must visualize the need for more careful consideration of food habits and taboos—of social science as well as scientifically based technology; we must see the need to carefully probe for methods of introducing technology in such a way as to disturb the customs of the past as little as possible.

This approach does not preclude the introduction of new technology. On the contrary, it can well make the case for even more sophisticated technology which may be needed to avoid rapid and drastic changes. It further brings to mind the point that a simple transplantation of existing technology is not sufficient to achieve the desired end. The technological solution to a problem in the developing countries may well have to be modified, changed and adapted to suit the local situation.

Again and again, one is forced to conclude that scientific values are not independent of human values, but are closely interrelated with them, and indeed part of the same fabric. The technology so essential in the developing countries to help them to become better developed must be applied in concert with human needs in an *acceptable* form, and at rates at which it can be absorbed. Special management skills will be important in achieving these goals.

This approach, then, will not only provide support

for life through economic development, but will, in addition, add *quality* to the life. Sufficient calories, protein, minerals and vitamins can feed large numbers of people. However, to enjoy the nourishment potential available in a food, the people must consume it with zest and gustatory delight. Many an American P.O.W. died in the Far East during World War II because he did not want to, and indeed did not, eat rice. Thus the human factor assumes gigantic proportions in this race of growing population and the specter of hunger.

We must also consider one final point: scientists are human beings also, and as such are just as liable to err as other mortals. Science does not reduce the risks for us; we can only hope that it helps us to pick the right risks to take.

Samuel A. Goldblith, '40, is Professor of Food Science and Deputy Head of the Department of Nutrition and Food Science at M.I.T. He was a member of the Panel on the World Food Supply (and Chairman of its Subpanel on Increasing High Quality Protein) which reported to the President's Science Advisory Committee in May, 1967, and he is widely known for innovative research on processes for food preservation.



A broader recognition of self-interest, rather than narrow paternalism, is the key attitude for businessmen moving into the area of urban problems

Henry M. Morgan, '48

# One Company's Experience in Creating Employment Opportunities

During the last year, American business has become increasingly aware that some new kind of response to its social environment is called for. Business is beginning to see that it cannot successfully operate in a specialized world of organizational charts and financial reports. Riots cost money—business money. Poverty costs money—not only for welfare services and costs of crime and delinquency, but also in the undeveloped potential market for goods. Poor education is an extravagant waste of tax dollars. Too much is being spent in a system which produces too many unproductive and alienated people, hostile to society.

Businessmen are coming to know that all these interrelated problems affect profit and successful operation very deeply. At the same time some community spokesmen, disillusioned with the results of charitable and government efforts, are turning to business leaders as a last hope. Both parties are stressing business self-interest as a valid and important motive. Business is not, and cannot become, a group of do-gooders. Most modern businesses rejected paternalism as a philosophy long ago, or were forced into other attitudes by the successful efforts of organized labor. Many benevolent businessmen have put time and money into philanthropy. Any significant efforts by business as an institution must be justified by a need to increase profit.

Even long-range benefits to the community's prosperity, which in the long run mean increased profit to the business, are not entirely sufficient justification for expenditure of time and money. Any business in a tight competitive situation has to operate out of a strong commitment that its efforts will lead to short-term results on its quarterly balance sheet, as well as the long-range benefits. It is not helpful to have contributed to the well-being of the community some 10 years hence, if you go out of business in five years.

I believe that the increasing recognition of industrial self-interest is an honest and healthy motive

which will lead to effective action, even though traditionalist nonbusiness groups will look on it with some suspicions. Interestingly, I think it is the motive of self-interest which many poor people will welcome. It is better to be considered to have potential value, and to be rewarded in economic terms, than to go on receiving Thanksgiving baskets. There seems to be a growing agreement among the poor with Thoreau who said, "If I knew for a certainty that a man was coming to my house with the conscious design of doing me good, I should run for my life."

I do not want to give the impression that I am opposed to government efforts to reduce poverty. But we may not be as affluent a nation as we think we are, in terms of our national aspirations. Like other business people, I am increasingly concerned that the war on poverty is, as Sylvia Porter said when the bill was passed, "like taking a fly swatter into a jungle." What we need are basic changes in social structures to prevent social problems. Business is an important social institution which holds one important key to combating poverty:—employment.

Today, business involvement in urban action is still by and large tentative and apologetic. Inexperienced business leaders get caught in the cross fire between fiercely competing factions in the ghettos. They are confused by the fact that their conscientious steps toward constructive action are met with hostility. There is much emphasis on the difficulty of the task, much talk of "hard-core" problems. The average businessman may find it all a little frightening.

It may be reassuring to describe some of the specific measures which have worked at KLM in creating job opportunities over the last 11 years. The company has achieved a fair amount of success in hiring Negro and other minority groups, as well as people with limited formal education and other handicaps to employment. While KLM met problems along the way, they were not large.

may be refrained alongside new products for the new product line.

There are several aspects to the training, which consists of basic work exercises to develop skills, performance of single cycles of a task to develop accuracy, short production runs to develop speed, and finally production runs to develop stamina. Primarily, it provides trainees a quiet permissive atmosphere in which to become skilled in a work operation. During training, the company can make its expectations clear to the new employee, over a period of time. For those who have never worked before, this is important.

### **A Diverse Work Force**

KLH Research and Development Corporation, located in Cambridge, Mass., manufactures and markets high quality stereophonic sound equipment. Eleven years ago, one of its seven employees was a Negro American. By 1961, seven in 70 were black, maintaining the 10 per cent ratio, which is about the ratio of black to white in the Boston area. No one thought much about this policy of integration; the company was simply and logically hiring the best-qualified applicants without any stereotypes of what an employee should be. By 1963, there were 200 employees, roughly 20 of whom were Negro. The company had become a small, congenial group of people from widely diverse cultural backgrounds, united by an identification with the product they were creating.

Working conditions were established in which everybody was treated equally fairly. Black employees received raises and promotions and were fired, praised, and chewed out along with white employees. The company encouraged its employees, particularly the receptionist and others in the personnel department, to do their jobs without preconceived ideas about people whose appearance and styles of communication differed from their own.

As the company expanded, it was always easy to get job applicants. Whenever KLH advertised or sought applicants through the Massachusetts Employment Services, word of mouth spread in several Negro communities that the company would hire and would promote Negroes. Both black and white applied. Word of mouth brought applicants in the same way from other minority groups such as a Portuguese-speaking one in East Cambridge.

At present KLH has roughly 700 employees. At least 30 per cent are black; another 5 or 10 per cent speak languages other than English, primarily Portuguese or Puerto Rican. Notices and instructions on factory bulletin boards are posted in three languages. Some 60 per cent of the em-

ployees are female, the percentage of Negro women being higher than that of Negro men. Of course figures and percentages change fairly rapidly, since new people are being hired.

A recent survey found that 47.5 per cent of the factory workers interviewed had not completed high school. KLH is now successfully hiring and training many who are defined by the government criteria as "hard-core unemployables." That term is never used at KLH, except to describe the people the company cannot hire; nor have I heard the term at other companies which are successfully creating opportunities for employment of minority group members and people without formal education. The company does not pretend to be rehabilitating those with serious handicaps: it takes pride in its work force. Certainly the employees do not consider themselves to be "poor" or "hard core"; neither they nor KLH consider that they are receiving "preferential treatment."

### **Attracting the Applicants . . .**

KLH has been fortunate in having an urban location, with access by bus and subway. Its employees come from some 20 different communities, clustered along the lines of public transportation. As long as possible, a manufacturing company like KLH does well to keep its urban location in order to be accessible to an urban work force.

KLH was also fortunate in having a diverse work force from its beginnings. Once a certain point is reached in integrated hiring and promoting, the applicants will come mainly through word of mouth. Word will go out, if it is true, that an applicant will not automatically be turned down because he is black, because he did not complete high school, because he lacks English language fluency, because there is something criminal in his background. But obviously a few window dressing Negroes will not accomplish this purpose.

I do not want to overstate what KLH accomplished, and it is important to emphasize that there were

"I suspect that if two men appear equal, then the Negro may have the greater ability"

## One Company's Experience In Creating Employment Opportunities

applicants who lacked the emotional stability to show up regularly to do the work. Many others in the city have given up, and do not even seek work. KLH does not claim to have reached this group, except perhaps indirectly in demonstrating that job opportunity does, after all, exist. The company's first aim was to find a person who can do a good job. It could not hire anybody who came along.

Many of the major barriers to employment, however, are entirely artificial. It is not necessary to have a high school education to do most assembly line work. We found that people without much formal education can be challenged, trained, and promoted into higher jobs. At present an employer will certainly not get many Negro employees if he sets rigid rules about the number of years of formal education completed. He may miss some very competent employees.

If he has reason to believe that an employee will be dependable and competent, an employer may also have to overlook some criminal records. One ex-prisoner, paroled from a life sentence, has proved to be a highly motivated and valuable employee at K.L.H., working his way up from production work into a management position.

For production line work, KLH has looked for two things: ability to learn the job, and a degree of dependability. Ability to do the job is measured by simple tests. In the test for dexterity the applicant picks up and places metal pins in a hole three at a time; in intelligence testing he must piece together geometric forms and then place them in a mold; to measure perception he picks numbers and letters formed by patterns of print on a page. The test does not discriminate against lack of a formal education or language problems. It does, however, isolate those applicants most likely to make successful electronics component production workers.

To judge dependability, the company examines references from former employers if there are any. In hiring young people, people on parole, tran-

sients, or applicants referred by community agencies with programs to build employability, the company does not have references to go on, and depends on a skilled interviewer to determine whether the applicant can learn to meet the company's expectations.

### ... and Treating Them with Respect

Underpaid workers are likely to be either apathetic or cynical. They are unlikely to identify with a company and become productive members of the group. KLH has tried to keep competitively ahead of the going wage rate and to offer good benefits and reasonable sick leave.

It was found important to have a very formal and very fixed step structure for wages. Merit systems make insecure people more insecure, and in the case of minority groups can lead to charges of discrimination. Once a worker knows what he can expect to earn as he continues with the company, only then can he develop motivation to work for other incentives. Step structure of wages does not hold back able people, for these motivated people can always be promoted, encouraged to take further training, and upgraded.

At KLH trainees are hired before they are trained, and they are paid well above the minimum wage during the training period. To them, the training is part of the job, as I believe it should be in industry. Because the productive output of the trainees can be used almost at once, industrial job training is comparatively inexpensive to operate. For the same reason, the tie to an actual job gives meaning to the training in the eyes of the trainee. The training program at KLH is closely tied to production schedules and new product development, to make most efficient use of its economic value to the company. Trainees sometimes construct samples for product engineering, and during the process production problems can be analyzed. They are taught the skills necessary to produce the product to which they will be assigned on the production floor. At the same time older employees



may be retrained alongside new trainees for the new product line.

There are several aspects to the training, which consists of basic work exercises to develop skills, performance of single cycles of a task to develop accuracy, short production runs to develop speed, and finally production runs to develop stamina. Primarily, it provides trainees a quiet permissive atmosphere in which to become skilled in a work operation. During training, the company can make its expectations clear to the new employee, over a period of time. For those who have never worked before, this is important.

In this sheltered setting, the trainees develop as a small social group. They are not alone in their newness; anxiety, which reduces productivity, is cut down. Through their fellow employees, they have a chance to become familiar with the company and to absorb the atmosphere of opportunity which KLH has tried to create.

On leaving the training school, trainees are usually put to work on a line together, as a team, with some older employees. In this way the value of the small social group is retained within the larger company. This initial small group identity may be one of the most important values of the training school.

Whether it is the skills training, the reduction of anxiety, the chance to identify with a small group or the emphasis on opportunity, the training has clearly led to increased productivity. For example, a trained line of new employees produced 165 units a day of one model, while the old line continued to produce 140 units a day. In another case, a new line was trained to replace an older line producing at most 60 units a day. The new line produced 80 units a day. According to the study which was made of the training program: "The training school generated production savings in excess of start-up and operating costs."

After training, KLH expects high performance and dependability from all its employees. Any double standard for minority group people would be insulting them. To be successful in hiring black people, I believe a company must have respect for individuals. It is not enough to treat black and white alike—the mistake of the inexperienced employer. People must be treated equally fairly, and regarded as equally valuable, but they are not alike, nor should we want them to be. Executives, supervisors, and personnel people must recognize that people differ from one another. Their job is to find and make use of the strengths of the individuals. Fellow employees at KLH never seemed to find this difficult to do, although sometimes supervisors have had trouble with it.

Once in a while, I was accused of reverse discrimination by middle management people. If two employees were being considered for promotion, one black and one white, I often recommended advancing the Negro. This was not for moral reasons, though such reasons exist, but simply because it has been my experience that some Negro men are less aggressive in putting themselves forward and revealing their talents. I suspect that if the two men appear equal, then the Negro may have the greater ability. This suspicion has been validated again and again.

On one occasion, a supervisor persuaded me to promote a white employee instead of an apparently equal Negro American, because promoting the Negro would have given a particular department all black leadership. This was the only time in my experience at KLH that racial considerations ever entered into a decision of this nature. I felt at the time that this was not a valid consideration. Again, my hunch was that the apparently equal Negro probably had the greater ability. As it turned out, within a few months it was obvious that for the job in question, the Negro American was far superior, but he had been more shy in selling himself. Six months later, he was given the job after all, and performed very well. The fact that the department had all black leadership did not turn out to have any importance.

### **Continuing Training**

Training for upgrading may be much more important than entry training. Even when an integrated hiring policy is well established and employees are treated fairly, a company has only begun its job of manpower development. The unskilled, and those without formal education, may cluster at the bottom of the ladder, while holes appear higher up which are hard to fill. In an expanding company, many of the workers should have aspirations for the job above their own; people perform better in a climate of opportunity.

KLH has always encouraged its workers to take

# "Women are not working for frivolous reasons but primarily for the very reasonable motive of avoiding poverty"

courses outside, paying a share of the cost. The company sends some employees to take courses such as management training. In recent years the emphasis shifted to providing in-plant opportunity for further education.

In co-operation with the Cambridge Public Schools, English is being taught at the factory to the non-English speaking employees who want it. Another educational program offers an intermediate course in electronics to fill the company's need for more and better testing technicians. Working with the Center for Continuing Education at Northeastern University, KLH now has plans under way to develop a wide diversity of in-plant adult education opportunities, from top management on down.

The company does not insist on pushing people upward into jobs they do not want. One competent worker is satisfied with his job of supervising only three workers, and does not want to move out of it. In the case of a few of the Negro men, however, we did make a special effort to overcome the "post office syndrome" which can make them reluctant to rise to new challenges and take new risks. In a few cases, we had to plead with an employee to accept advancement we knew he could handle.

One Negro American applicant for a management position was a classic example of this problem. This very capable, personable college graduate had worked for the same company for 10 years at an incredibly low salary for a man of his ability. During his 10 years there he had increased his pay only \$20 a week, and was earning less than most secretaries are demanding. Yet he was reluctant to leave the company and come to KLH at higher pay. His was another case in which I was accused of reverse discrimination, because I recommended considering what he was worth in making him an offer, rather than a slight increase over what he was getting, and also because I thought we should make an effort to overcome his reluctance to make a change. With this man, as with many Negro men, it was neces-

sary to look below the surface facts. He did finally come to KLH, where he is a valuable employee.

Several years ago, before the training was introduced, KLH studied what its workers wanted from their jobs. Out of five factors—job security, wages, opportunity to increase wages, opportunity to advance to more challenging jobs, and fringe benefits—the most important factor in four out of five of the production departments was job security. In the fifth department, which consisted almost entirely of longer service employees, the results were different: job security, wages, and opportunity to advance to a more challenging job were of equal importance. This group, through longer service, knew that they had job security, and were able to respond to other incentives. Among test technicians, a more highly skilled group, the first choice was opportunity to move to a more challenging job. This group had the self-assurance to consider job security a low priority incentive. For all employees, the least important incentive was always fringe benefits.

My guess is that if a company provides job security, and then makes an effort in training and upgrading, it will produce a more highly motivated work force, responding to other incentives. The motivation will be on behalf of the individual and his career, rather than loyalty to the company. Training apparently defeats paternalism. A slight increase in turnover may be the price a company pays for this kind of work force. This can be reduced by other incentives, or regarded as a price worth paying for an action-gearred group of workers.

## Working Mothers

The work force in the United States contains 28 million women now, and a projected 36 million by 1970. According to Department of Labor statistics, women are not working for frivolous reasons, but primarily for the very reasonable motive of avoiding poverty. Negro wives especially must work if the family is not to be poor. One out of two Negro wives

holds a job to bring the family income above the poverty level. Yet neither government, nor organized labor, nor industry has given much attention to developing policies which take into account the fact that women bear children, that they must enter and leave the work force for this biological reason, and that their children have important needs.

The more we learned about the child care arrangements mothers have to make in order to work, the more concerned we became for the children. One young couple took their child to a sitter every Sunday night and picked him up every Friday night. This expensive arrangement split up their family, and provided poor care for the child. Later they sent the child to live with relatives in the South. This young couple needed to work. It appeared that our society was providing them with too few options.

We developed the idea of an educational center providing good care for children near the factory, where the parents could be encouraged to play a strong role in their children's lives. This project is under way, jointly funded by the parents, the company, and the government. Administrative organization is planned to discourage paternalism, and to develop strong parental responsibility and participation.

The child development center is intended to demonstrate to government and to industry the kind of care that is needed for the children of working mothers, what such care will cost, and what the value will be to the community and to industry. The business advantages are expected to be many. Recruiting costs may be cut and a wider pool of applicants may be available. Absenteeism, late arrival, and turnover may be reduced. In the last year KLH lost 17 employees whose baby-sitting arrangements broke down; and there is a fairly high rate of absenteeism and tardiness among mothers. Production may be measurably affected by the reduction of family-related anxiety. Both amount and quality of output are expected to improve.

The child care project is still being planned by its professional staff and some of the future parents. It seems a promising area of industry-government co-operation, since there are interests which coincide, and since neither industry nor government is likely to be able to meet the need alone. In the future, parents and staff working together may come up with some ideas worth trying out as a solution to the problems of working mothers who have infants. One idea, for example, might be two mothers sharing the same job, and sharing infant care.

Looking back on my years at KLH, I feel that one important thing I tried to bring to the company was a respect for people and a philosophy of personal development for all employees. In a rapidly changing technological society, the education of adults must be a continuing process. There have always been many avenues to education. Industry and the armed forces have provided society with effective educational programs. It is likely that much of the needed ongoing learning in the future will take place on the job, since few members of society can return to a university for periodic educational re-tooling.

From top management training, to entry training, to preschool education for children of working mothers, business has a strong self-interest in education. It is at least as structured for education as other institutions of the future. I think this is the road to profitability and away from paternalism.

The greatest value of business participation in educational projects may be its freedom to encourage diversity. Any community will gain from a number of different pragmatic approaches, richness of options, and competing, innovative ideas. A group from outside the established field of education can contribute to its broadening, and can encourage new ideas and new solutions. Business is only one such group, but it is one with as much stake in the results as any. If business will take a fresh look at its own operations, and its relation to the community, many innovative approaches to solving social problems may turn out to contribute to business success and to profits.

Henry M. Morgan is Special Assistant to the Governor of Massachusetts with the task of developing employment opportunities for the underprivileged. Until recently he was President of KLH Research and Development Corp., a company with which he was associated for the past six years. He is President of the H. M. Morgan Company of Cambridge, a company formed four years ago. Mr. Morgan holds an Sc.D. degree in mechanical engineering from M.I.T.

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A vivid demonstration of the pace of technological change: this laboratory notebook records the entry of Walter H. Brattain just over 20 years ago when the transistor effect was discovered at Bell Telephone Laboratories on December 23, 1947. The entry describes the event and adds, "This circuit was actually spoken over and by switching the device in and out a distinct gain in speech level could be heard and seen on the scope presentation with no noticeable change in quality." (Photo: Bell Telephone Laboratories)

DATE Dec 24 1947  
CASE No. 38139-7

We attained the following A. C. values at 1000 cycles

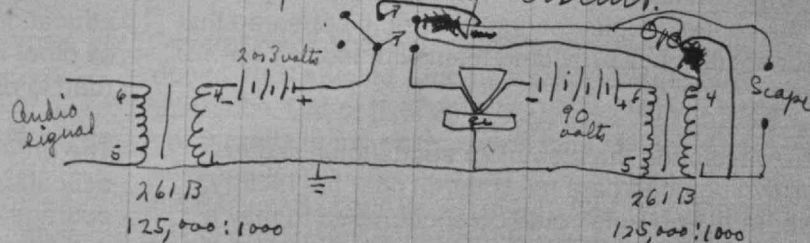
$$E_g = .015 \text{ R. M. S. volts} \quad E_p = 1.5 \text{ R. M. S. volts}$$

$$P_g = \frac{6 \times 10^{-8} \text{ watts}}{5.4 \times 10^{-7} \text{ watts}} \quad P_p = 2.25 \times 10^{-5}$$

Voltage gain 100 Power gain 40

Current less  $\frac{1}{2.5}$

This unit was then connected in the following circuit.



This circuit was actually spoken over and by switching ~~the~~ the device in and out a distinct gain in speech level could be heard and seen on the scope presentation with no noticeable change in ~~power~~ quality. By measurements at a fixed frequency

8 DATE Dec 24 1947  
CASE No. 38139-7

in it was determined that the power gain was the order of  $10^2$  or greater. Various people witnessed this test and listened (were present) of whom some were the following R. B. Gibney, H. R. Moore, J. Bardner, G. H. Pearson, W. Shockley, H. Fliteler, R. Brown. Mrs. H. R. Moore assisted in setting up the circuit and the demonstration occurred on the afternoon of Dec 23 1947

Read & understood by  
S. H. Pearson Dec 24, 1947  
H. R. Moore Dec 29, 1947

Today's technology can potentially alter the whole way of life in underdeveloped societies; tomorrow's will revolutionize our own lives, for good or ill

George A. W. Boehm

# Electrical Engineering for Tomorrow

Historians looking back from the vantage point of the year 2020 may point to the current information explosion as the most crucial development of our era. Very likely they will attach little importance to the headline events of today—the 1968 U.S. presidential election, de Gaulle's domination of the Common Market, and revolutionary stirrings on the Chinese mainland. Compared with what is now being done to exploit information, political transactions may appear in the long run no more consequential than the strivings of kings and cabinet ministers in Europe as the industrial revolution took form 200 years ago.

The upheaval in information handling is based on the three C's that preoccupy most electrical engineers today: communication, control, and computation. In recent years electrical engineering has become the most cosmopolitan field of research and development. Men who design electrical circuits work hand in hand with those who study the human brain and those who ponder abstract mathematical properties of automata. They are united by a mutual concern about information, its basic nature and how to manipulate it. The result has been a rich mix of science and technology which probably accounts for much of the success of engineering in the U.S. Walter A. Rosenblith, Professor of Communications Biophysics who is now Chairman of the M.I.T. Faculty, was one of the first engineers to branch out into biology; he explains why this mix is essential: "Technology has to be potent so that it can ask the most interesting questions. But it cannot be muscle-bound with humdrum problems, or else it may never get around to asking those questions."

Modern electrical engineering has become a freewheeling field. In addition to its traditional concern with the behavior of electrical circuits, it is involved in the study of biological networks, interactions of human groups, and the nature of language. The broadening of interest can be traced back 20 years to three events that occurred in the space of a few months. Firstly, Bell Telephone

Laboratories announced the invention of the transistor. This tiny device enabled engineers to handle information at much greater speeds and in much greater quantities than ever before. Secondly, Claude E. Shannon, Ph.D. '40, then at Bell Labs and now Donner Professor of Science at M.I.T., published *A Mathematical Theory of Communication*. This provided a precise and quantitative language for describing information in all its forms. And finally, Norbert Wiener published his now famous book *Cybernetics*. The unifying influence of the book is suggested by its subtitle: *Control and Communication in the Animal and the Machine*.

## The New Social Physics

An awareness of the momentum that is gathering is just beginning to filter into the circles of people who influence political and social decisions. One who is already very much aware is Daniel Bell, the noted Columbia University sociologist, who like a latter-day John the Baptist has been preaching the coming of the "post-industrial" society. In his words: "If the atom bomb proved the power of pure physics, the combination of the computer and cybernetics has opened the way to a new 'social physics'—a set of techniques, through control and communications theory, to construct a *tableau entier* for the arrangement of decisions and choices. In fact, it is not altogether fanciful to suggest that just as the 100 years before 1945 were dominated by machine technology, so the next 50 may be shaped by a new intellectual technology, which, by systems analysis, simulation, game theory, programming, and other methods hitched to a computer, will lay out a new compass of the rationality of means."

The promise, as Bell intimates, is enormous. But in some centers of engineering excellence the air is fogged with apprehension. The pace of science and technology pertaining to information threatens to outstrip society's ability to absorb new developments without a severe case of social and economic indigestion.

Gordon S. Brown, '31, Dean of Engineering at M.I.T., has predicted that within the next decade information processing will alter man's way of life as profoundly as did the invention of printing. At this precipitous rate there will be few opportunities to make mistakes on a small scale. Minor miscalculations may prove disastrous, for law and custom will have too little time to adjust to the pace of new technology. One threat in particular disturbs many of the leaders in information science. They fear that the growing capability to record information about every individual, then associate facts (or lies) and retrieve them, could lead to wholesale invasions of privacy that would fulfill George Orwell's nightmare vision of 1984—perhaps even earlier than Orwell anticipated. Commenting on this possibility, neurophysiologist Jerome Y. Lettvin, '47, of M.I.T.'s Research Laboratory of Electronics, says despairingly: "It is not up to the gods; it is already in the cards."

The realization that they have given birth to a great potential for good or evil has awakened a new sense of social responsibility among electrical engineers. They are in a position not unlike that of the atomic scientists after Hiroshima. Electrical engineers used to be hard to find in Washington councils, outside the military agencies. But now in increasing numbers they are busy with public health, urban planning, and other social problems of the day in which the flow and analysis of information is critical. In this way they are meeting a standard that Gordon Brown urged his fellow engineers to adopt two years ago, when he wrote: "Our faculty must, in addition to being scholars in the strict academic sense, be men who participate daily in the mainstream of contemporary national activity with a forward-looking viewpoint. They must occupy a central leadership position in modern intellectual thought outside M.I.T." In other words, engineers are embracing the Quaker ethic of being generally concerned.

### **Present-Day Goals**

How fast will the new electrical engineering advance? Probably more rapidly than a cautious man would predict on the basis of research and development now in progress. Assuming that some current projects will bear fruit and others will wither away, it would seem reasonable to multiply today's hopes by a factor less than one and estimate accordingly. But this does not allow for the unexpected insights that will produce unifying theories or major inventions. "Mankind consistently errs in the direction of lack of foresight and imagination," says Nobel laureate physicist Charles H. Townes, former Provost of M.I.T. and now Professor-at-Large at the University of California. "We continually underestimate the power of science and technology in the long term . . . The element of

surprise is a consistent ingredient in technological development and one we have great difficulty in dealing with on any normal planning basis."

Nevertheless, much current research and development is headed toward goals that can almost surely be reached without unforeseeable strokes of genius or luck. Several ideas, for example, promise to bring down the cost of power and equipment. Superconducting windings will probably soon be used to provide stronger magnetic fields for large turbogenerators. This will mean more power per pound of machinery, creative savings in fuel and materials that are expected to halve the cost of a \$12 million, 600-megawatt generating station. Solid-state switching devices will make it feasible to generate alternating currents at more than 1,000 cycles per second; the benefits from this will include further savings in generating equipment and smaller, cheaper motors for many purposes. Other solid-state devices for converting D.C. to A.C. will make it economical to transmit D.C. power over fairly short distances; this is desirable because loss from D.C. lines is lower than from A.C. lines, particularly at very high voltages. M.I.T.'s High Voltage Laboratory is working on compressed gas insulation that may make it possible to bury transmission lines instead of stringing them overhead.

On the receiving end, tiny integrated circuits will greatly improve many appliances. Fabricated from small chips of silicon, I.C.'s are inherently much cheaper and more reliable than conventional circuits. The original impetus for developing them came from the need for extraordinarily compact computers to be carried aboard airplanes and spacecraft. But now I.C.'s are to be found in radios, television sets, and hearing aids, and within a few years they may be common in almost all electronic equipment.

In countries like the U.S. these developments will add up to more comfort, additional conveniences, and further economies. But in underdeveloped nations they may dramatically alter the whole way of life. For people now drifting along with a backwater technology, they will provide a boost to a degree of industrialization that poor countries simply cannot afford at present.

### **Computers to Serve the Man in the Street**

The newer and less predictable ventures of electrical engineering will more profoundly alter life in parts of the world that are already technologically sophisticated. The spearhead will be, of course, the electronic computer, although some of the versions now being developed will little resemble today's computers. So versatile is this machine becoming that some engineers now want to rename



it: the word "computer" suggests a high-powered adding machine, but the capabilities are extending so far and in so many directions that it would be more aptly called "information processor."

Up to the present computers have been used almost exclusively for storing and retrieving long lists of facts and performing long series of elementary calculations. More and more, though, they are being geared to formulate judgments and make decisions that are not obviously numerical, such as identifying people by their voices, or analyzing the meaning of written sentences. This is the way in which they will help to lay out Daniel Bell's "new compass of the rationality of means," by doing the kind of idea processing that is hardly ever done because it is too tedious and too costly. Amazing though modern computers may be, their potential has barely been tapped. Not long ago a panel of the President's Scientific Advisory Committee declared: "After growing wildly for years, the field of computing now appears to be approaching its infancy."

Perhaps within a decade most people in the U.S. will be able to use a computer almost as easily as they use a telephone. At present the computer works offstage, out of sight of the average citizen. It calculates his payroll check, draws up his bank statement, and inspects his income tax return. It makes little difference to him that these jobs are now done electronically rather than by human clerks. He may notice slight gains in efficiency—for example, he may find it easier to balance his checking account, or receive an occasional reminder from the Internal Revenue Service about a little income he forgot to report—but he never actually uses a computer for his own purposes.

If engineers can perfect "time sharing," almost everyone will be able to subscribe to computer service much as they do to telephone service, and perhaps at not much greater cost. In fact, sharing the time of a large computer is not unlike subscribing to the facilities of a telephone exchange (which happens to be a very large specialized computer).

Techniques of time sharing are being worked out at M.I.T.'s Project MAC, in which two large and fast central computers are linked electrically to almost 250 typewriter-like consoles in various parts of the campus. Any person who has access to one of these instruments can use the central computers. He asks questions or poses problems by typing a message. After processing the information, the computers reply by transmitting answers which are automatically typed out by the console. The basic problems are to keep the

computers as busy as possible all the time and to minimize the time the "customers" must wait for their answers. This requires a hideously complex system of scheduling and priorities that directs the computers to flit from problem to problem. The machine may work on one customer's problem for a few hundredths of a second; then turn its attention elsewhere; then return to the first problem for another fraction of a second. With this scheme, a customer can expect a prompt answer to a simple question; indeed, he will probably not realize that his request has been processed intermittently. And the answer to a really large time-consuming problem will be produced almost as rapidly as if the machine were working on it full time.

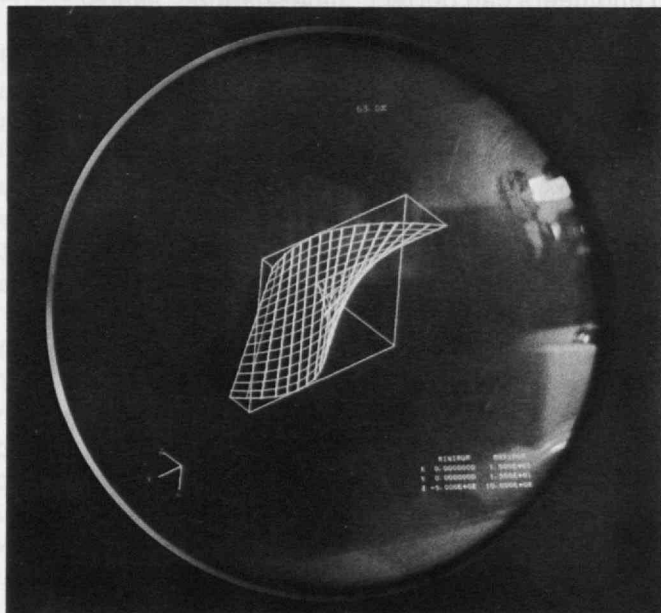
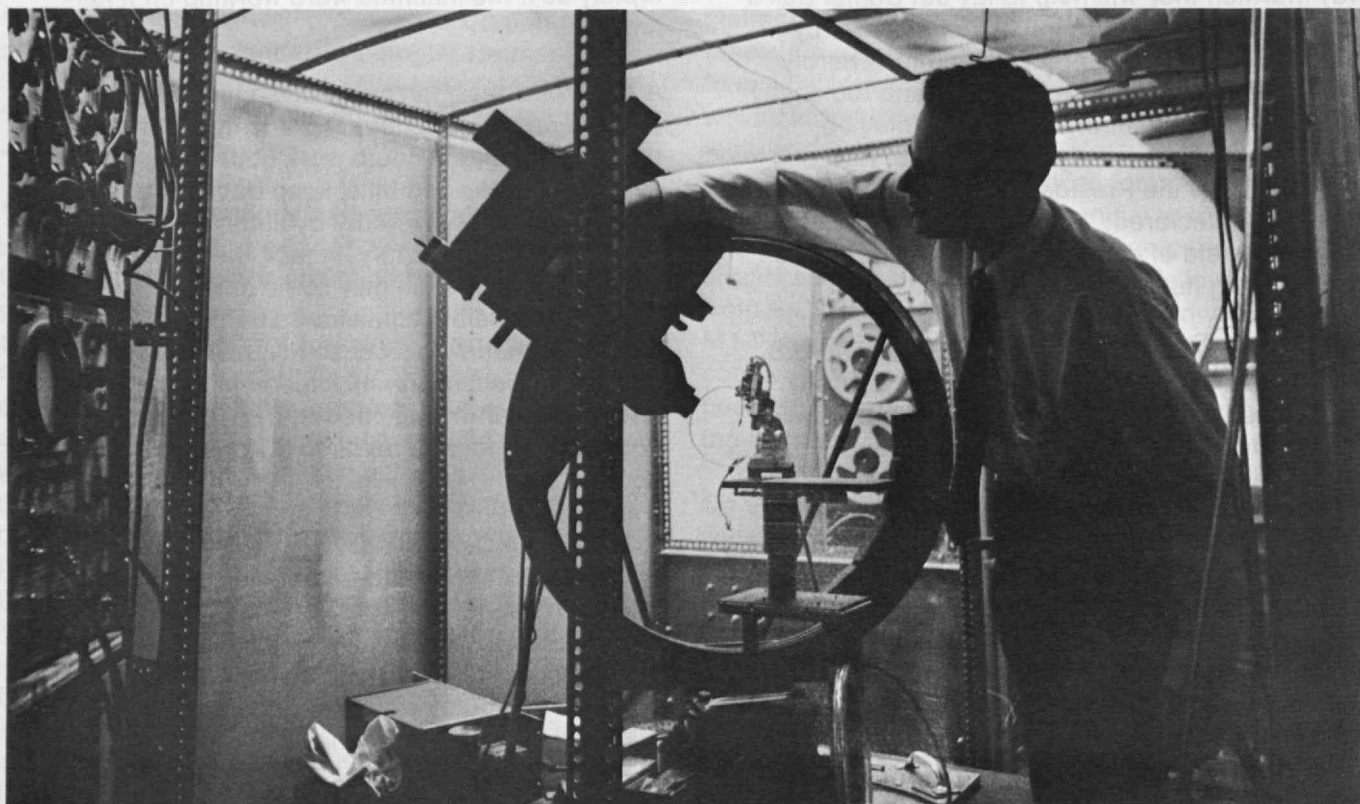
A small businessman could use a time-shared computer to do all his accounting and much of his routine planning. It could work out his payroll, send out checks and bills, keep track of receipts, and even control inventory by automatically ordering items in short supply. In fact, the whole banking and credit system may some day be reorganized as one big time-shared computer exchange. A man with a console in his home or office could request a bank statement at any instant; and instead of writing checks, he could direct his computer to transfer funds to his creditors' accounts.

### **Breaking the Communications Barrier**

In the long run the success of time sharing and, indeed, most other aspects of information processing, will depend on how well engineers can handle communications—between man and computer, between computer and computer, and between man and man. A hint of what is to come is the modest collection of instruments on the desk of one of Bell Laboratories' noted computer pioneers, John R. Pierce. Most prominent is a Picturephone, forerunner of the television-telephone sets that are to be introduced commercially in a few years. On its five-inch screen people talking over the phone can see each other's faces clearly and can illustrate their points with drawings and other documents. Pierce also has a push-button console that gives him access to a variety of information. He can ask for weather conditions at the nearby Newark Airport or the latest quotations of a few stocks. Or he can connect with a computer and give it simple problems to solve.

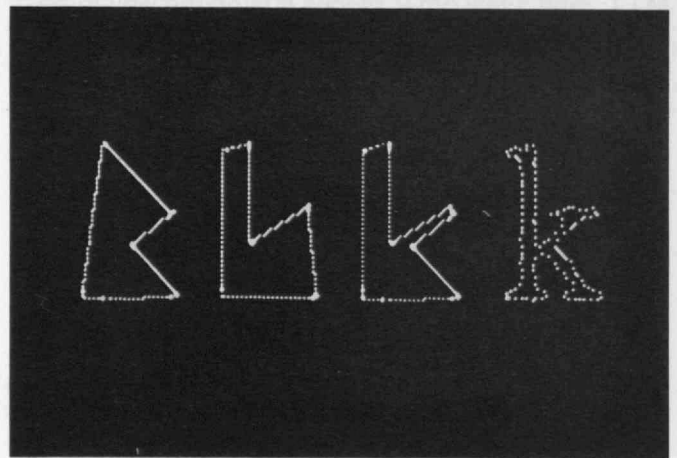
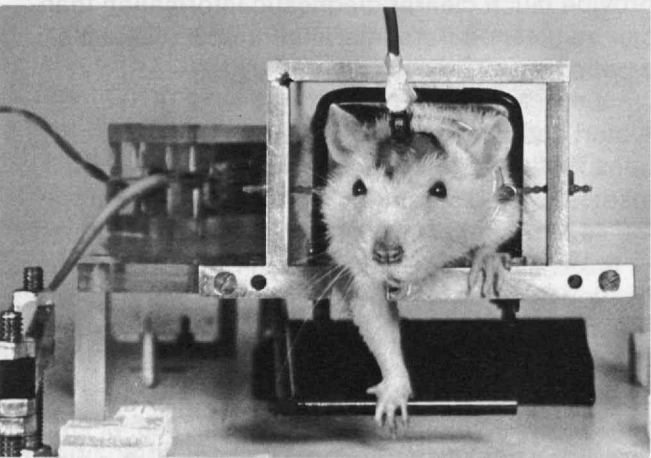
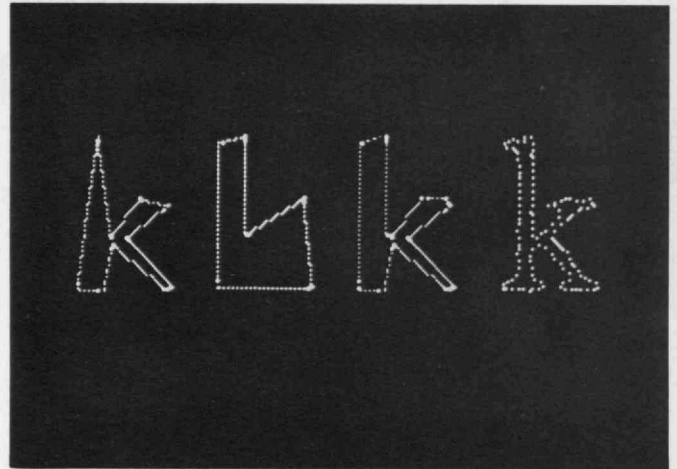
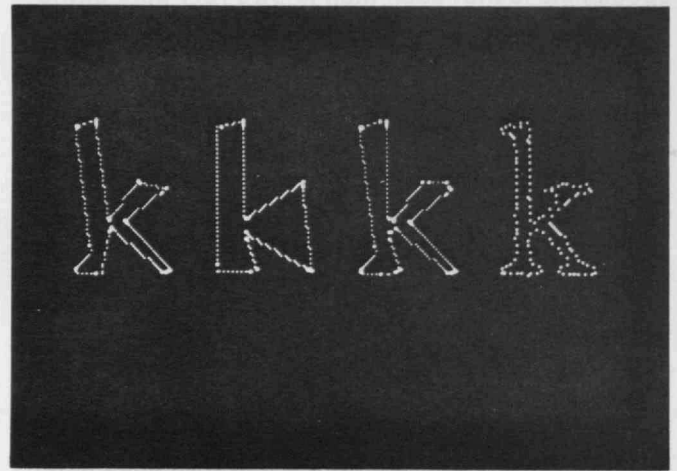
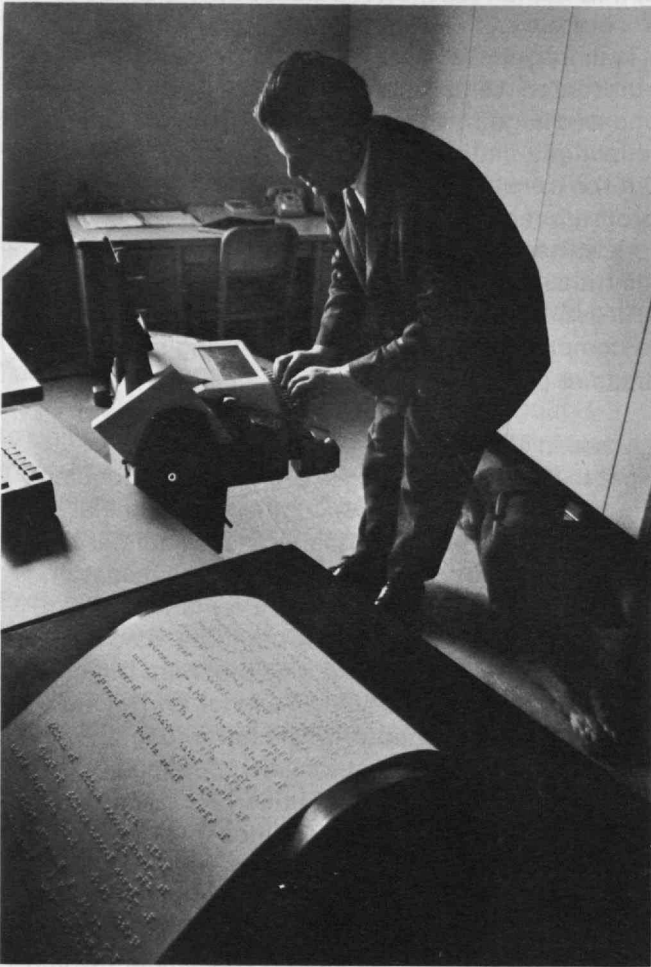
Though this desk-top information system is rudimentary, it suggests great changes in business, government agencies, and other large organizations. Given a reliable video-voice link, university professors and other consultants will no longer have to travel to Washington periodically, for conferences can be organized more efficiently elec-

A glimpse of the future in M.I.T. electrical engineering laboratories: (top) research on the electrical activity of single nerve cells in the retina of the ground squirrel is concerned with mechanisms of chromatic adaptation; (below, left) constructing a complex digital system using integrated digital circuits; and (below, right) a system of computer programs, called Equilibrium Problem Solver, developed at M.I.T.'s Project MAC makes possible visual display of arbitrary algebraic functions.





The future is communication; research at M.I.T. includes; (left) tests of human electrical and verbal responses to sound stimuli; (below, left) such aids for the blind as equipment for rapid conversion of printed text to Braille; (below, left) electrophysiological studies of discrimination behavior in the rat; and (bottom) the intermediate products of research on the character-recognition element in an experimental reading machine system to present a blind listener with spelled speech.





tronically, with every participant sitting in his own office. In businesses it may prove unnecessary for executives to be present in their offices. "Instead of commuting to work, we will communicate to work," says Pierce. Many organizations may abolish most centrally located offices; most of the time, most of the employees would be able to work where they live. In the long run this development might put the brakes on the headlong rush to urbanization.

The very structure of large organizations may change radically. The basic reason for the conventional hierarchy of staff executives and line specialists is that each man knows very little of the information that is critical to the organization; this tends to restrict each man to a limited role. Instant access to all sorts of information would remove this restriction. The typical organization would be run by executive task forces, temporarily assigned to specific problems. This setup would relieve men of much monotony and challenge them to produce original ideas of great variety.

To many older people, a civilization dominated by information processing seems horrendous. They see a threat to their livelihoods, even to humanistic values. Not so with students who have been exposed early to computers and their uses. At Dartmouth recently a professor read aloud to his class a paragraph explaining that the computer was a monster. The reaction of the students, all liberal arts majors, was to burst into laughter. They knew better, for Dartmouth has made computers available to everyone on campus on a time-sharing basis, and has even installed consoles in nearby primary and secondary schools. Students learn in a couple of hours how to work with the computer by communicating in a special language called BASIC that is based on common English and elementary algebra.

### **Computers in Education . . .**

At present the computer is, in most schools, a bold educational adventure. But at Dartmouth, M.I.T., and a few other places it is on the way to becoming a standard facility, like the library. An obvious way to use computers in education is to have them retrieve the sort of information usually kept in libraries—video tapes and films as well as books and periodicals. The aim, according to Anthony G. Oettinger of Harvard's computation laboratory, "is simply that anything available in any library can be made available to anyone anywhere within what *he* thinks is a reasonable time." Naturally this would require electronic memories far greater than those in existence today. But as Jerome B. Wiesner, Provost of M.I.T., points out, computation costs have been coming down by a factor of five every four years, and there is no reason to

doubt that this trend will continue. At this rate, it is conceivable that within the next decade or so every child could have the entire contents of the Library of Congress at his fingertips. Whether this would be desirable is debatable. John Pierce, for one, doubts that mass retrieval of information represents the most efficient use of computers.

Used in other ways, computers promise to relieve the teacher shortage. The first generation of "teaching machines" was based on fairly inflexible programs, applicable chiefly to drilling students in grammar, algebra, and other fundamentals. The next generation will more nearly mimic the inspired human teacher. A patent newly granted to E. N. Adams of I.B.M. covers such an application. It is a program for instructing the computer to edit sentences that the student translates from one language to another. Instead of being restricted to multiple-choice questions, the student types out the translation in his own words. Then the program replaces wrong or missing words and letters with hyphens. After the student has corrected his translation, the machine comments tersely: "RIGHT"—which, for students fully accustomed to computers, may prove as reassuring as a warm smile or a pat on the back.

### **. . . and in Medicine**

Next to education, health is probably the most fertile new field for electrical engineering. Panels from Harvard and M.I.T., meeting last summer to explore new directions for co-operative research and engineering, came up with a remarkable number of prospects. Holography could be adapted to microscope images, giving a helpful third dimension to pictures of cells (see *Technology Review May, 1967, p. 21*). Electronic pattern recognition could be employed for automatic counting of white cells, malignant cells, malarial parasites, crystals in urine, and abnormalities in the retina. Computer classification of fingerprints would be helpful in research on human genetics. Instruments to meter blood flow could be developed. Tele-metered signals from implanted transducers would provide much clearer diagnostic information than can be gleaned from intermittent observations of a patient.

A start has already been made in several directions. Bell Labs, for example, has no fewer than 80 medical projects, ranging from implanted instruments to systems analysis of hospital operations. At M.I.T. a Cognitive Information Processing Group, headed by Professor Murray Eden, is working on several ways of bringing information processing to bear on health problems. One of the most interesting programs is devoted to sensory aids for the blind (see *Technology Review, Dec., 1966, p. 28*). The primitive step is spell-speech, in which a writ-

ten page is scanned by a computerized "eye" that can recognize individual letters in a variety of fonts. The system then calls out the letters in a synthesized speech. One blind graduate assistant has learned to follow spell-speech at the rate of 20 letters per second. This amounts to about 90 seconds per printed page, which is considerably faster than many blind people can read Braille, and also faster than some sighted people can read anything.

Beyond that is synthetic speech generated by a computer that scans a page. Although still not fully developed, it is promising. An M.I.T. research group has "taught" the computer a dictionary of 10,000 morphs (fractions of words) and need only double this quantity of language lore to have a system that is practical. Their computer program handles a number of knotty problems that would confuse many a person not familiar with English. With the aid of rules for analyzing sentence structure, the computer intonates phrases correctly and naturally. It can also handle many words that are phonetically irregular. For example, it recognizes that "quadruped" is not the past tense of a verb, and it differentiates between the two pronunciations of "refuse," as a noun and as a verb (see *Technology Review*, July, 1967, p. 33). The immediate goal is to complete the dictionary of morphs and to reduce the cost of equipment to about \$25,000. Then schools and special libraries can afford to have a computer to read to the blind.

### Problems for Tomorrow

While engineering can clearly help the health sciences in many ways, biology has been teaching electrical engineers some important ideas. Studies of the brain and the nervous system of lower animals reveal why biological systems can in some cases process information much faster than the largest computers. Though built of nerve cells that are individually erratic, brains manage to perform quite accurately by working on several parts of a problem simultaneously and, in a manner of speaking, taking a consensus of the results.

With the introduction of microelectronics, initiated by integrated circuits, brainlike organization of information processing becomes thinkable, if not immediately practical. What can be expected is hinted at by the tube in the Picturephone that picks up the image. The critical part is a wafer of silicon the size of a nickel. Processing converts it to a grid consisting of some 600,000 separate diodes, each capable of storing a dot of light or shadow that can be read by an electron beam scanner. Some of the diodes can fail without spoiling the quality of the picture, provided that not too many fail in the same part of the wafer. It is conceivable to build computers that work much like the array

of diodes. In fact, a well-established theory says that, with parallel circuitry, performance actually improves beyond a certain high level of complexity.

Along with expanding opportunities to invent and improve devices that will profoundly alter man's dealings with man and his outlook on the universe, electrical engineers are confronted with several fundamental problems. One is the necessity of limiting innovation to what is workable. With so many possibilities of doing better and better, it is increasingly frustrating for a creative man to "freeze the model" and produce something that works today, although it may be outmoded by something else that is possible tomorrow. The general solution, Pierce points out, is to devise systems that are inherently improvable. Revolutions, he says, are so expensive that designers should try to avoid them; instead they should leave room for small changes wherever possible.

The capacity for processing information also presents the hazard that man will be flooded with more information than he can readily handle. As every child need not have access to every book, neither should every executive know every detail of his business. The solution here is a concept that is sometimes known as "exception reporting." That means: program the information processor to make judgments and deliver only the information that is unusual or indispensable.

Then there is a much broader problem. What is information and who owns it? Neither law nor custom is yet clear on this point. The U.S. Patent Office refuses to consider applications regarding computer programs, although for inventiveness some of them match any of technology's achievements. Yet anyone buying or renting a computer today finds that much of the expense is for "software"—i.e., programs and procedures, which are information in almost pure form. And what about an individual's rights to facts about his thoughts, his preferences, his credit rating? Engineers cannot decide these questions, but they represent one area in which engineers can play a vital role in public councils.

George A. W. Boehm is one of the nation's pioneer science writers. He has held positions with the American Chemical Society, *Newsweek*, *Scientific American*, and *Fortune*, and is now writing on a free lance basis.

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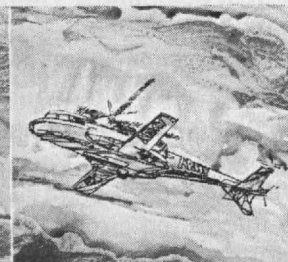
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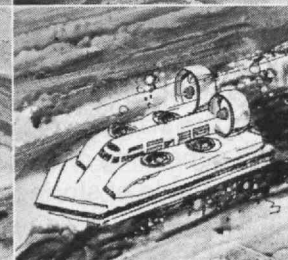
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PLAN B (DISCOUNT)	@	\$	<b>FOR INCOME CERTIFICATES ONLY</b> <input type="checkbox"/> Mail Bank check quarterly for interest to payee at address shown below <input type="checkbox"/> Credit interest quarterly to Harvard Trust checking account Number _____
PLAN C (INCOME)	@	\$	

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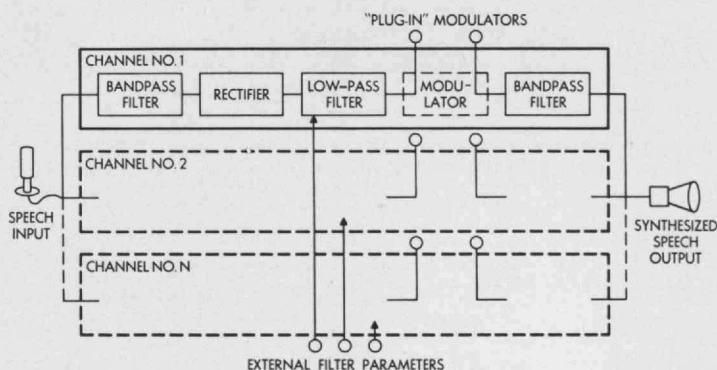
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Report from  
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# Breadboarding the modern way



Scientist Barry J. Karafin of Bell Laboratories checks chart recorder waveforms from a BLODIB simulation. Karafin uses the computer console at his right to interact with the simulation program. This feature was developed for the BLODIB program to give users the flexibility of making changes in such things as component values without having to re-program an entire system.



A hypothetical voice-analyzing/synthesizing system (resembling Bell Laboratories' "vocoder")... and how it might be simulated with BLODIB. The system would have a number of band-limited channels, each consisting of such blocks as BANDPASS FILTER, RECTIFIER, and LOW-PASS FILTER. Once the experimenter specifies one channel, he can call upon it, complete, as many times as necessary. Such a system analyzes a voice input into "channels" (narrow frequency bands). It then synthesizes (recombines the channels) so that the speech output can be heard on earphones or over a loudspeaker. It might be used to test relationships between channel width and intelligibility. To experiment with various MODULATORS, the user can leave "open terminals" (blank sections) in the program and "plug in" (supply sub-programs for) simulated modulators. The LOW-PASS FILTERS have externally variable parameters, such as cutoff frequencies; these parameters may be supplied by a user during simulation or by another computer program.

More and more, engineers use digital computers to simulate new electronic systems. It's often faster and cheaper than breadboarding... building an experimental system.

But simulation is most useful if the experimenter can "talk" to the computer in his own language... a block diagram symbolizing an electronic process. To translate such a diagram into a computer simulation program, scientists at Bell Telephone Laboratories designed an intermediate program or "compiler." The latest version is called BLODIB for BLOCK Diagram compiler B (pronounced "Bloody Bee"). BLODIB's output is a simulation program—in machine language.

The BLODIB user needs little programming experience. He writes a description of a block diagram and its connections in terms from the BLODIB dictionary... which contains abbreviated names for most blocks, such as AMP for amplifier. The description need not follow signal flow; BLODIB arranges it properly.

The BLODIB dictionary cannot contain a block for every possible electronic function. But many new blocks can be built up from those available. And, if one combination will be used many times in a design, it can be named and used as often as necessary.

To test prototype systems, the experimenter can leave parameters variable, or he can even arrange for their values to be supplied by another computer program for automatic simulation throughout a range of settings. Also, if he is doubtful about, say, a filter, he can simulate his system without the filter and "plug in" simulation programs for various experimental filter designs. In this way, several designs can be tested before investing in a laboratory model.

The BLODIB program has been used to simulate acoustical and visual systems and was recently used to study automatic equalization techniques for Bell System data sets.

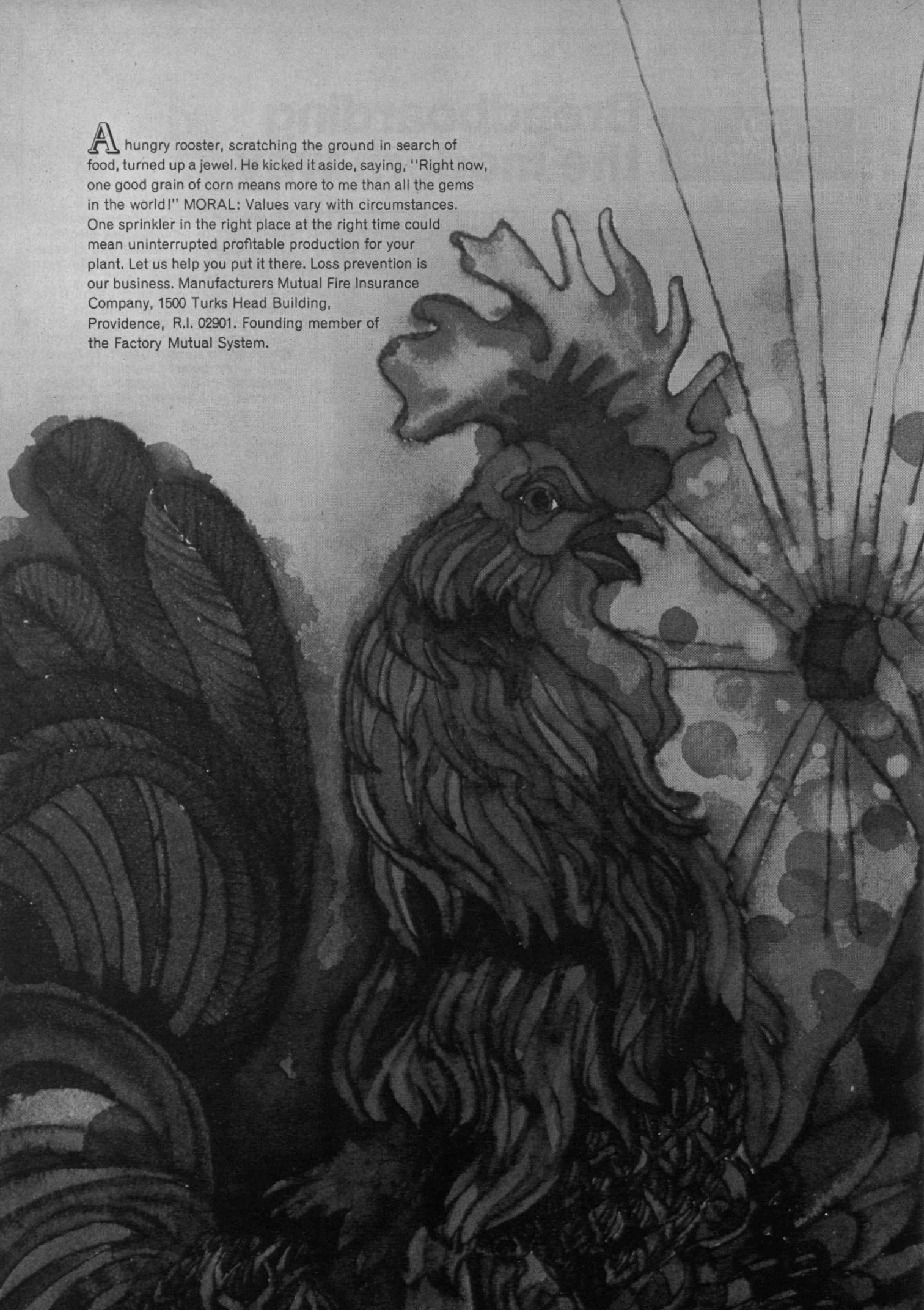
The first block-diagram compiler, BLODI, was conceived and developed at Bell Laboratories by V. A. Vyssotsky, John Kelly, and Carol Lochbaum. B. J. Karafin recently formulated the BLODIB program which extends the original BLODI program so it can interact with non-BLODI programs and provide the flexibility described above. This makes it an even more powerful tool for probing potential systems over a broad range of operating conditions.



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# Trend of Affairs

## Two Cultures Merge

Long-haired artists and more severely tonsured scientists mingled at M.I.T. in March, and found that they occasionally understood the same language. The occasion was the joint dedication of two new M.I.T. Centers—for Theoretical Physics, and Advanced Visual Studies; the medium of togetherness a series of seminars on science and art, designed to add spice to the ceremony.

In many ways, science has close links with art. Jerome Y. Lettvin, '47, Professor of Communications Physiology at M.I.T., pointed out that good science and good art required the same approach—seeking and exhibiting interesting relationships between objects. He viewed the double helix of D.N.A. as a problem of aesthetics as much as one of science. Philip Morrison, Professor of Physics at M.I.T., also saw close links between these two aspects of man's endeavor: art, he said, has a direct connection with man's sensory equipment, while science reacts on man's senses at second hand. George Wald of Harvard, the only Nobel prizewinner present who was not attending the concurrent program on theoretical physics (*see story below*) emphasized the gap that exists between knowing and creating epitomizing science and art on the one hand, and application and production on the other.

Given this near identity, what does science have to offer art? Ivan E. Sutherland, Ph.D.'63, pioneer of Sketchpad, claimed that the computer, at least, offers the artist more than just a new kind of medium. It allows him to create objects impossible in the nontechnological world, such as displays of patterns and art forms with which the observer can interact.

Perhaps because they were meeting at M.I.T., the artists generally found themselves on the defensive. Indeed, at one point an anonymous, self-styled artist jumped onto the platform to take the place of a fog-bound panel member and "hold up the artist's end of the bargain."

Possibly artists are no longer sure of the ground rules when science intrudes into art. Thus Billy Kluver, President of Experiments in Art and Technology and a member of Bell Telephone Laboratories, noted: "The saw that the artist should know his materials no longer applies. Experimentation is legion, and demanded." Apprehension was evident in the attitudes of two Fellows of the new Center for Advanced Visual Studies. Harold Tovish viewed science with mixed awe and elation—an ambivalence which shows up in his sculp-

ture—while Otto Piene regarded science and technology as new tools to make art bigger. He saw computers as machines to build objects, but questioned whether they could say anything meaningful.

Can art react upon science? Robert Wilson, an amateur sculptor in the spare time from his job as Director of the Weston 400 BeV particle accelerator, pointed out the values of artistic centers in science-based schools. Engineers' exposure to art and artists, he felt, will provide a feel for aesthetics in future design work.

Another question of aesthetics arose at a later symposium. Jerry Lettvin questioned the contribution of machines to the aesthetics. He has not yet come across computer-generated art that transcends the intentions of the artists, he said, adding that such art had no place in his living room. But Ivan Sutherland, at whom the harangue was aimed, cast himself in a passive role. As a technologist, he said, he aims to discover what technology can do. From then on, it's up to the artist. Certainly, Sutherland continued, a computer cannot produce aesthetic quality to order.

Philip Morrison raised a more fundamental question later in the meeting. The two new Centers exist largely to perpetuate new generations of artists and theoretical physicists—proponents of two of man's most esoteric followings. "Just what is the point of all this endeavor?" asked Morrison. Commenting on the symposia, an Institute Professor asked the same question in stronger terms: "Just how close does either theoretical physics or science-based art come to the real world?" Artists and theoretical physicists may have started a dialogue, but can the casual eavesdropper understand it?

## Search for Unity

While some of their number were engaged in debate with artists (*see story above*), a galaxy of physicists of international repute was hearing of the state of the theoretical physicists' art, in a symposium to coincide with the dedication of M.I.T.'s new Center for Theoretical Physics. Not unexpectedly, particle physics, seen by many of its practitioners as the ultimate aesthetic and scientific experience, dominated the symposium.

One of the basic problems of nuclear physics is how the particles in the atomic nucleus bind together. Nobelist Hans A. Bethe, Professor of Physics at Cornell, dis-



Informal scenes inside and outside the conference rooms at the joint dedication of M.I.T.'s Centers for Theoretical Physics and Advanced Visual Studies: Nobel physicist Hans A. Bethe of Cornell chats with Herman Feshbach, Ph.D.'42, Head of the Center for Theoretical Physics (top right); Gyorgy Kepes, Head of the Visual Arts Center, and Institute Professor Philip Morrison (Physics) indulge in an art-science dialogue (center right); Wayne V. Andersen, Associate Professor of the History of Art, calls for psychedelic effects in an art-science seminar (bottom, right); and youthful admirers view a special exhibition in the Visual Studies Center (below). (Photos: Owen D. Franken, '68)



cussed refinements of present models of such forces in large nuclei, and Gerald E. Brown, Professor of Physics at Princeton, described the extension of the problem of interactions between nuclear particles from the relatively simple two-body forces to concurrent forces between three and more bodies.

In many ways, elementary particle physics today is in a similar position to that of chemistry a few years before Mendeleev unified the subject with the concept of the periodic table of the elements. Physicists recognize that an all-encompassing theory is a near-certainty in the next few years, but at present must satisfy themselves with groping efforts at intermediate solutions. Julian S. Schwinger, Professor of Physics at Harvard, called for a more flexible approach to the subject, and Tsung-Dao Lee, Professor of Physics at Columbia, applied such an approach in a newly developed theory of current algebra, which treats particles and the forces between them in terms of funda-

mental currents. In fact, Herman Feshbach, Ph.D.'42, Head of the new Center for Theoretical Physics, told *Technology Review*, "The meeting revealed a surprising unanimity of feeling that flexibility was an important goal" in theoretical studies of elementary particles.

One important unifying theory in particle physics has been the eightfold way, proposed by Murray Gell-Mann, Ph.D.'51, of Caltech. An important facet of this was the concept of strangeness, described mathematically as a quantum number, which received spectacular confirmation four years ago with the discovery of the omega minus particle. Dr. Gell-Mann reported to the symposium that his recent work on weak forces between particles suggests the existence of a whole new world of particles, undetected as yet, with a new quantum number. While this represents no more than one possibility among many, it offers an intriguing search to experimental physicists.



# Autos as a Disease

When two automobiles collide, it's a crash, not an accident. An accident is an event without logic, says Daniel P. Moynihan, Director of the Joint Center for Urban Studies of Harvard and M.I.T., but automobile crashes have their reasons, even though these factors are just beginning to emerge from a pre-scientific stage.

With the possible exception of modern warfare, Professor Moynihan says, the automobile is "the most conspicuous example of the impact of technology on modern society." More people have contact with government through the automobile than in any other way—more than through schools, more than through voting. But its effects have been curiously ignored, a phenomenon for which Professor Moynihan offers two reasons:

1. "To an amazing degree," the potential sources of funds and enthusiasm for research on technology and its effects in the U.S. are related to the automobile industry, the "most profitable in the world." Though the reluctance to study the automobile as a social phenomenon has not been "conspiratorial," Professor Moynihan believes, it has nevertheless been very real. 2. There has been no background of government regulation. The airline industry has grown in a setting of continuing military development, a federal participation from which automotive transportation is only beginning to benefit.

Until the very recent past, Professor Moynihan told an audience of M.I.T. graduate students late this winter, there have never been more than five scientists at any one time in the U.S. working on problems related to automotive safety. Real understanding began "almost by accident" when one of these workers conceived of automobile crashes as a form of disease, to be studied epidemiologically, a phenomenon not of chance but with a theoretical structure subject to analysis and control. We have only begun to see the results. One of them, the enactment of the first federal traffic safety legislation, represented the largest transfer of power from state to federal government and the largest federal regulation of private industry ever attempted in the U.S., Professor Moynihan said.

## Corrosion Control

Systematic reduction of corrosion in industry could save the United States several billions of dollars—an important economy for a country in the throes of a balance of payments crisis. For this reason, as well as the more obvious reason of improving the safety of metallic structures, we should pay increasing attention to reducing the taxes that environmental corrosion imposes on us, according to Herbert H. Uhlig, Ph.D.'32, Professor of Metallurgy and Head of the Corrosion Laboratory at M.I.T.

The greatest corrosion losses occur in the chemical, oil, and power industries, in marine structures, airplanes and cars, and in buried steel piping distributing oil, gas and water, Dr. Uhlig told the National Capitol Section of the Electrochemical Society in Washington

this spring. Yet in many cases metallurgists do not fully understand the processes whereby alien environments cause corrosion, particularly when relatively new materials are involved. And this lack of understanding is holding back the aerospace, hydrospace and atomic energy programs.

How can we prevent the bottlenecks that corrosion causes? Dr. Uhlig suggested that a National Institute of Corrosion Control, organized along the lines of the present National Institutes of Health, could play a strong role in furthering our understanding of corrosion. Such an institute could carry out research and development programs on corrosion problems encountered by small communities or businesses with insufficient capital to launch their own attacks on the problems.

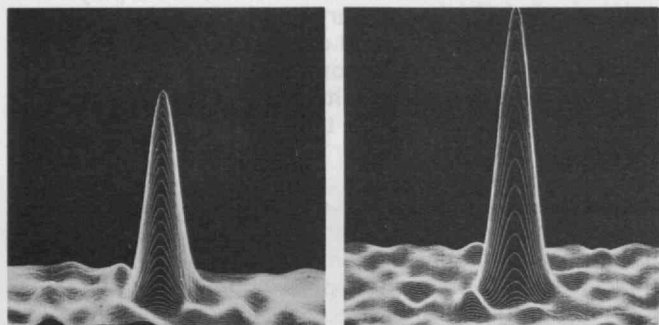
The proposed institute could also inform engineers, who often have no more than a superficial knowledge of corrosion, of the fundamentals of corrosion science. In fact, Dr. Uhlig predicted, engineering schools in general will have to pay more attention to the role of the environment in the behavior of materials. Whatever the strength and quality of today's new materials, it is the environment which dictates whether or not they can be used safely and economically in modern structures and machines.

## No "Human" Errors

Computers and people are moving ever-closer together. And no wonder: "The computer is superb at what we are not and we are superb at what it is not," Joseph C. R. Licklider of M.I.T.'s Project MAC said at Washington University this spring. "Never has there been a case of better rapport," he said. The computer never forgets anything, never gets sidetracked, never complains about routine work, never—in short—makes a "human" error.

Indeed, it is Dr. Licklider's concern that so far most of the assignments which people have given computers are "trivial," while we know, he said, that "computers can be used for things not trivial." As an example of the latter, Dr. Licklider described a computer programmed to conduct psychiatric-like interviews. The questions are "faked," because the computer can respond only on the basis of what it thinks it hears, but the experiment, Dr. Licklider said, "does tell us that a computer can be programmed to interact with people to get information out of them. And we know that a computer can take a description and turn it into behavior, can be programmed to simulate behavior. So we are beginning to understand how computer systems can interact directly with people," he said. Dr. Licklider was at Washington University to receive an alumni citation on the institution's Founders Day.

The improvement in the Lincoln Laboratory Haystack antenna system is strikingly illustrated by the "before" and "after" ruled-surface displays shown here, derived from antenna pattern measurements using the radio source Virgo A.



## Sharpening Haystack

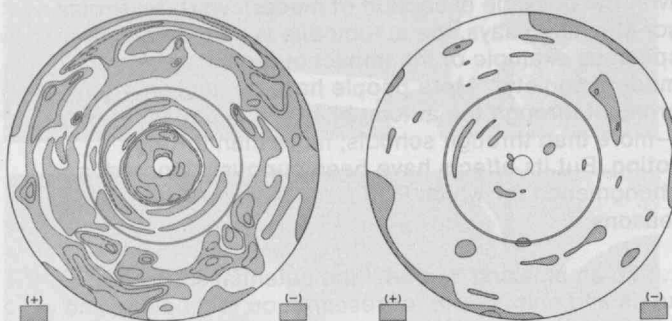
The primary reflector of the Haystack antenna system, Lincoln Laboratory's great radar "dish" 120 feet in diameter with an area of more than a quarter of an acre, has been readjusted to conform more precisely than ever to a perfect paraboloidal contour. The results have proved to be so successful that the procedures by which they were obtained are also worthy of note.

The Haystack antenna is shielded from the wind and weather and from direct solar illumination by a radome, and the air in the radome is warmed and circulated to minimize thermal gradients. The antenna's environment is thus much more uniform than that of any other large paraboloid antenna currently in operation, all of which are directly exposed to the elements.

After more than a year of painstaking analysis and planning, the readjustment of the reflector panels was based on optical surveys of over 1700 optical targets precisely located on the front face of the panels. To insure the greatest possible accuracy and consistency, sets of measurements were made on not more than 400 points on any one occasion, so that each set of measurements could be completed before significant thermal changes could occur; the number of targets in each set was based on a statistical sampling theory developed for the purpose. Extensive use was made of digital computers to process the data and organize the results. Thousands of adjustable standoffs and expanders are available to position and shape the panels, and each of these was repositioned and verified during the readjustment project.

The Haystack reflector now has a contour accuracy that is probably superior to that of any other microwave antenna of its size. In addition, it is certainly the most stable and dependable over a wide range of pointing angles and weather conditions because of the protection afforded by the radome. The root-mean-square deviations from a best-fit paraboloid have been reduced from 0.037 inch to 0.017 inch (under stable, nighttime conditions; at midday, despite the radome, the r.m.s. deviations may increase to about 0.025 inch, compared to 0.055 inch before adjustment).

In this contour map of the Haystack antenna, the entire unshaded area is within less than 0.025 inch—about five times the thickness of this sheet of paper—of a perfect paraboloid. The shaded areas are between 0.025 and 0.050 inch above or below the best-fit paraboloid, and only four isolated spots are more than 0.050 inch away from the ideal contour. These figures apply specifically to an elevation angle of 45 degrees but should not change appreciably between 20 and 70 degrees, because the antenna structure is designed to compensate for changes in gravity-loading over a wide range of angles.



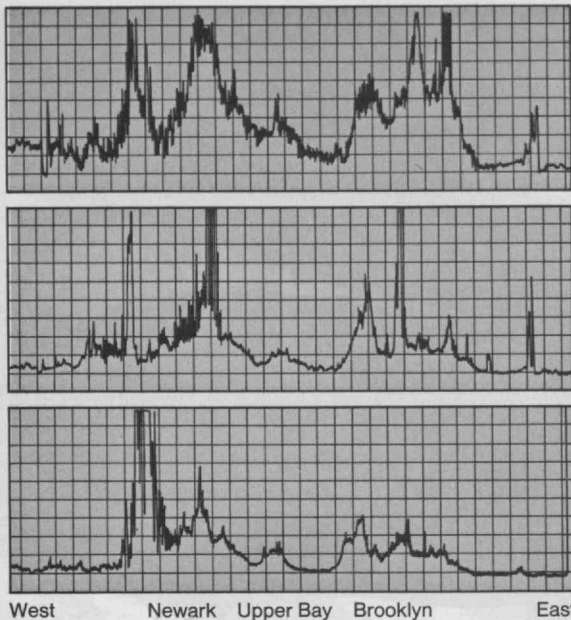
The objective of the readjustment, of course, is improved electrical performance. At 15.5 GHz (2-cm wavelength), the antenna gain has been increased by 40 per cent; the measured beamwidth is about two minutes of arc, and the highest sidelobe is 14 db below the main lobe. At 35 GHz, the highest Haystack sidelobes are now at least 9 db below the main lobe, and the antenna has a beamwidth of about one minute of arc. This is a resolution comparable to that of the human eye, and it is believed to be the highest useful resolution yet achieved with a single antenna system. At X-band frequencies near 8 GHz, there is convincing evidence that the two-way radar system sensitivity has been increased by about one decibel. Small as this may seem, it is equivalent to an additional hundred kilowatts of transmitter power in current planetary radar measurements.

## Urban Operations

The "next big job of infiltration" of operations research—the combination of mathematical models and operational experiments to predict the efficiency of future operations which has won acceptance in the military and then through a "domino" effect in industry throughout the world—is in the field of urban and regional planning, according to Philip M. Morse, Director of M.I.T.'s Operations Research Center. "Even in as complex and emotional thing as running a city," he told the Operations Research Society of America this spring, "there is a place for the quantitative analysis of facts and forces and action. And these analyses can assist in the wise and humane running of a city."

To support his argument, Professor Morse cited recent activities of the Organization for Economic Cooperation and Development—a conference attended by governmental officers covering the use of operations research in health services, hospital operation, public school administration, urban planning, and traffic management. In the urban field, he said, the jobs for operations research are big and urgent—and so broad that the mixture of specialists working on them will have to be nearly all-inclusive.





A Lincoln Laboratory aircraft flying at low altitude (2,000 feet) above the New York City area in November, 1965, obtained this profile of the U.H.F. noise generated in three frequency bands (top to bottom, 226 MHz, 305 MHz, and 369 MHz). George Ploussios, '55, of the Lincoln Laboratory staff, reports that the detail of power distribution is lost at altitudes of 8,000 feet or higher, where there is near-constant level of U.H.F. noise over the length of the urban area.

## Noisy Tourists

Urban noise pollution is omnipresent—and at frequencies ranging from audio to U.H.F. City dwellers know something of its intensities and distribution at the audio end of the scale, and U.H.F. noise has been recognized as a factor in the effectiveness of airborne communications. Now George Ploussios, '55, of M.I.T.'s Lincoln Laboratory, has added some useful detail to the question of urban noise at high frequencies.

In the U.H.F. range, coherent noise comes chiefly from communications equipment, but there is a large component of random, or incoherent, noise generated by ignition systems, power lines, and electrical machinery. It radiates upward and outward—and at altitudes above 5,000 feet over a city the many U.H.F. sound sources tend to blend into a "far field" of radiation in which highly localized sources such as highways and generators are no longer significant.

Mr. Ploussios analyzed U.H.F. noise measured by airborne equipment over eight East Coast cities, and he concluded that New York is clearly the noisiest. Miami turned out to be an especially effective site for Lincoln Laboratory's research because its boundaries are clearly defined—the ocean on the east, a great uninhabited swamp on the west. And it added one unexpected element to the results: measurements repeated in February, 1966, showed uniformly higher noise than had been found in November, 1965. There was no similar experience at any other location; "... clearly," writes Mr. Ploussios in the *I.E.E.E. Transactions*, "the implication is that the Florida tourist season has a definite effect" upon Miami's generation of U.H.F. noise.

## Food vs. Population

A new econometric model of India's agricultural industry suggests that the nation's battle between food and population can be won. And a systems analysis reveals that achievement of this victory depends upon maintaining the present momentum of agricultural

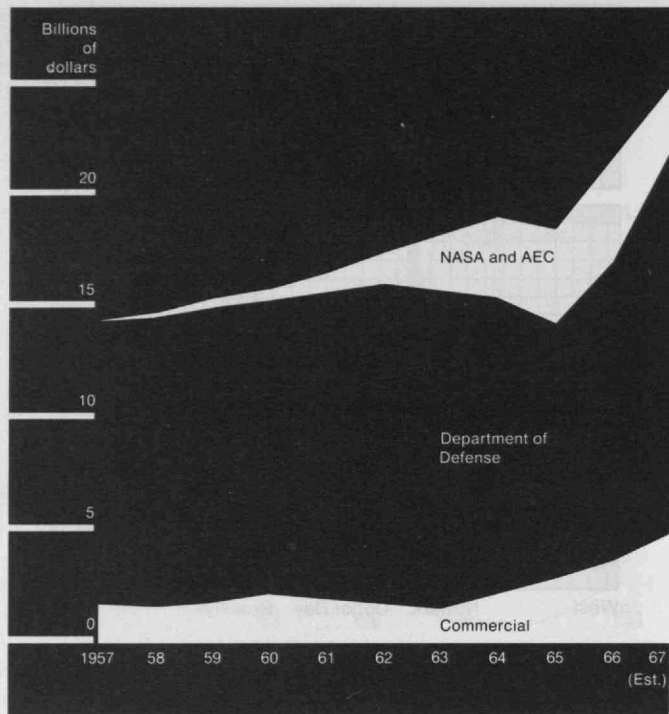
productivity and upon increasingly effective utilization of modern agricultural technology.

Willem Holst, '32, Vice President and Director of Esso Standard Eastern, Inc., was commissioned by the President's Science Advisory Committee to prepare an econometric model for exploring alternative solutions to India's food and population problems over the next 20 years. The model was based on a 10 per cent decline in birth rates by the early 1980's, considerably short of the government's 35 per cent target, and it begins with India's current food grain production of 95 million tons, which is close to self-sufficiency, according to Mr. Holst. To maintain self-sufficiency through 1976, production must rise 4.6 per cent per year, and Mr. Holst's model reveals that this annual growth is in fact "technologically feasible." Its feasibility is based principally on the use of improved seed varieties and markedly increased use of chemical fertilizers (from three pounds per acre in 1964-1965 to 40 pounds in 1975-1976), to change yields from 10.3 bushels per acre to as much as 30 to 40 bushels per acre.

"With the certainty of a record food grain crop during the current good monsoon year, and the real possibility of an agricultural breakthrough in the years ahead," Mr. Holst told a joint symposium of the American Institute of Aeronautics and Astronautics and the Operations Research Society of America early this spring, "it could appear that India's battle between food and population is being won. Unfortunately, technological feasibility and actual physical implementation are not necessarily synonymous." A systems approach which identifies the logistical support and other needs for agricultural production will be required, Mr. Holst said; it will help India achieve a steady increase of irrigation, logistical support such as farm machinery, fertilizer, trucks, roads, and storage depots, a successful distribution system for bringing these goods to the right place at the right time, and finally the new incentives to encourage farmers in the change-over from subsistence to market-oriented agriculture.



Defense is by far the largest customer of the aerospace industry, and other government agencies run a poor second. So it is an "inelastic" market characterized by specialized demand, according to Philip A. Untersee, '55, of Arthur D. Little, Inc.—a hard one to crack but potentially a profitable one for a fortunate and able technological industry.



## Oil and Knowledge

Statistics, computers, and econometrics have their place in long-range planning, but the prize in the petroleum industry still goes to the forecaster whose knowledge and judgment can overcome the "major uncertainties" in the industry's long-range outlook—government policy, changes in technology, and geological factors. This was the view of Richard J. Kruizenga, Ph.D. '56, Manager of the Economics Department of Standard Oil Company (New Jersey), in a presentation on petroleum industry forecasting techniques to the Council of Economics of the A.I.M.E. this spring.

Despite the increasing sophistication of forecasting tools, the simpler techniques still find widespread use. But changes are ahead. New tools and new information will soon remove some of the uncertainties: distributed lag techniques pioneered by econometricians offer better ways of estimating leads and lags in the interrelationships between economic variables; spectral and cross-spectral analysis, developed for deciphering information in electronic systems, may make possible better decomposition of time series; and new advances in statistical estimation of large simultaneous models may yield more realistic simulations from formal market models.

The application of new probabilistic techniques to the "basic, truly uncertain features in a firm's external environment" will be a "natural evolution in forecasting work," Dr. Kruizenga said. But "even if the forecasting arm of a firm were prepared to make such forecasts today, I'm not sure the decision-making arm would know what to do with them."

## No "Me-Too" Market

The aerospace industry is already capitalizing on the special properties of titanium and several more obscure new materials, but unfilled needs remain to challenge scientists and venturesome investors. This represents no simple technological opportunity: the applications are complex, the testing problems knotty, the volume likely to be low. But a proprietary niche based on a specialized position may well await the company with the superior product.

High-strength steels and superalloys based on nickels and cobalt (designed for the temperature range from 1200° to 1900°F.) have found use in jet engines and structural applications. Titanium has been chosen for many uses in the U.S. supersonic transport—some 100,000 pounds of it will be used in each plane—because of this metal's low weight, high-temperature stability, and corrosion resistance. Beryllium is extremely light and strong at high temperatures—but brittle. Composites are growing in use; rocket cases are now being made of spiral windings of glass filament with plastic binder, and there is promising research on boron, silicon carbide, graphite, and other materials as filaments for such applications. Tungsten, with a melting point of over 6000°F.—the highest of any metal—has found use in rocket nozzles.

But the demand continues for materials to serve at ever-higher temperatures. Polymers, ceramics, inter-metallics, and semiconductors are all needed by the aerospace industry, and all represent significant opportunities for materials research and development, according to Philip A. Untersee, '55, of Arthur D. Little, Inc. But the industry's requirements are unique, he warned members of the American Chemical Society at its annual meeting this spring in San Francisco; companies interested in the market will have to make "substantial" investment of their own funds in research and development. "The aerospace industry," he said, "is no 'me-too' market for a materials supplier."



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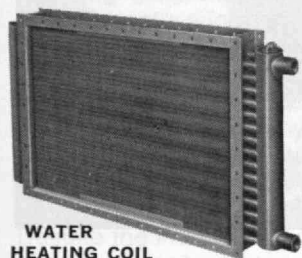
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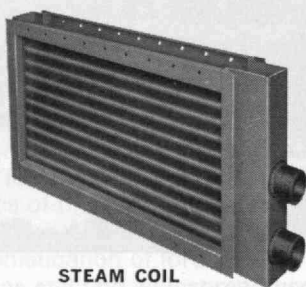
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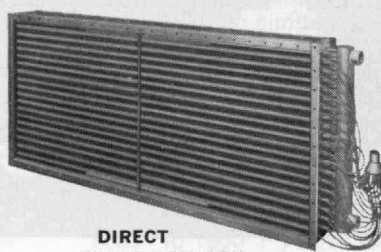
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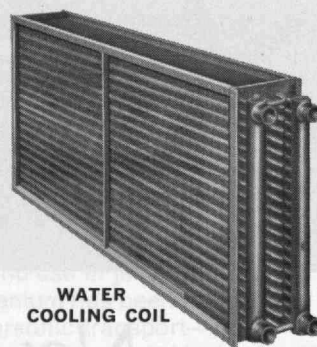
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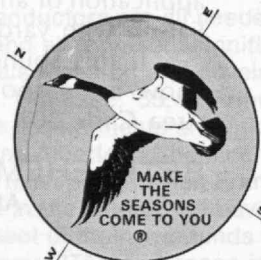
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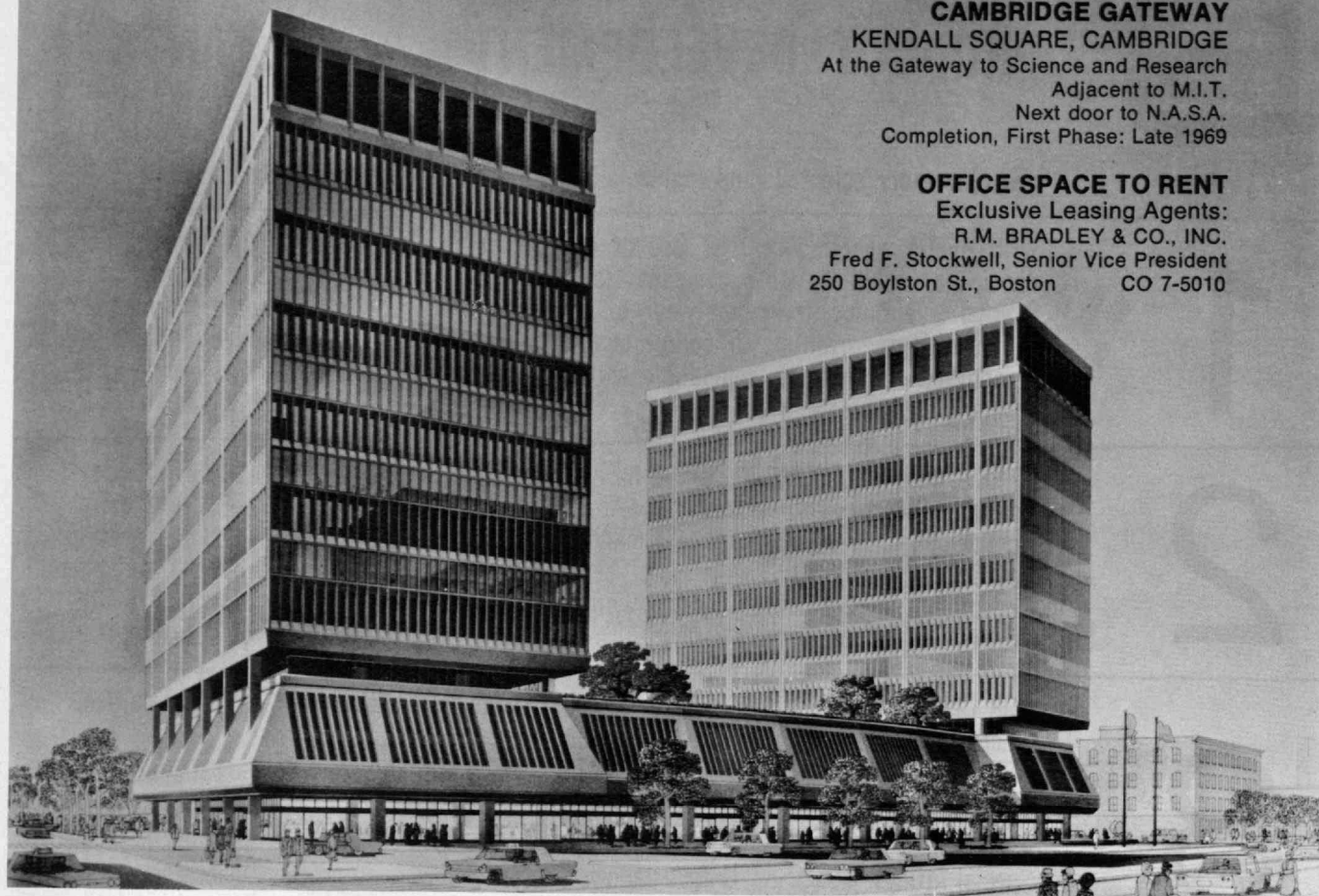
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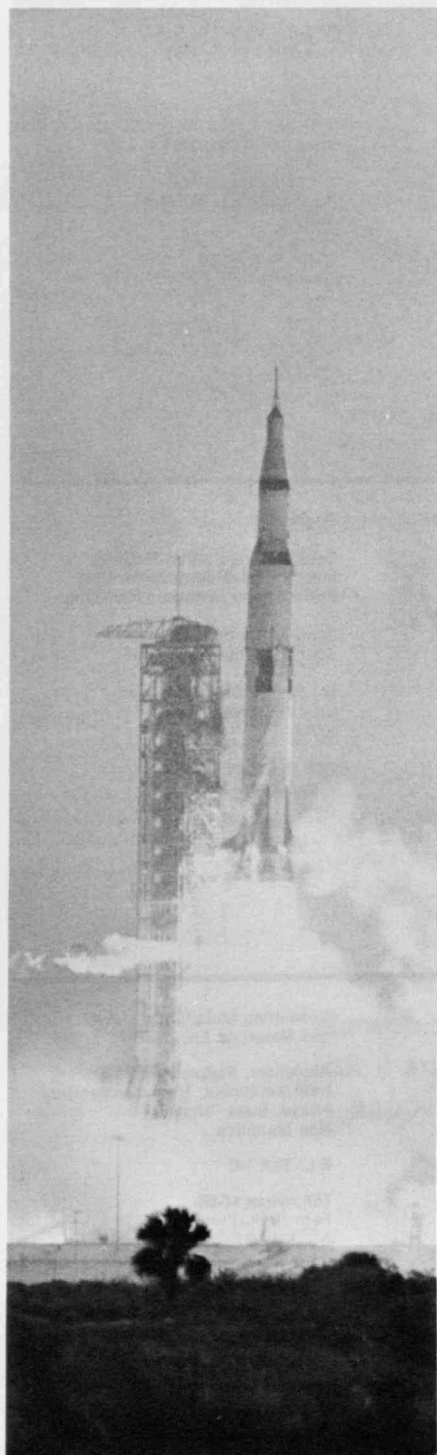
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# How It "Feels" at Cape Kennedy



When I went down to Cape Kennedy for the launching of Apollo 6 I had no idea what the test would be like. True, I knew the facts about the mission, but I didn't know how it felt.

I know that the rocket was 363 feet tall and generated 7.5 million pounds of thrust. I hadn't stopped to think that 363 feet is longer than most destroyers in the U.S. Navy and that the first-stage motors had enough power to lift a destroyer, too. The rocket and all the gear surrounding it were built on a grand scale—everything was so big and so complex I wondered how any group of people could ever have moved the project this far along.

I began to get some idea of just how it was done before I reached Florida. I was taken on a guided tour of the building in which the M.I.T. Instrumentation Laboratory people designed the guidance and navigation system for the spacecraft. James H. Flanders, '53, Deputy Associate Director of the Laboratory, showed me through rooms where the original testing work had been done—these are now devoted to more advanced work, and to final testing of each software package for the guidance computer as it's produced. Some 300 men work on this project, which has gone on since there was an Apollo program.

I found, when I reached Florida, that there are considerably more men at work there—some 20,000 for Kennedy Spaceflight Center alone. Right then, all their attention was centered on Pad A at Launch Complex 39, where the AS-502 was waiting.

I got my first good look at her the evening before the launch. I was driven past the Vehicle Assembly Building, itself the grandest of buildings (though no longer the world's largest; the Boeing S.S.T. plant in Washington is larger in total volume), and out toward the rocket. The tower that surrounds the rocket had been partially removed, and so for the first time since the vehicle had been placed on the pad it was in clear view.

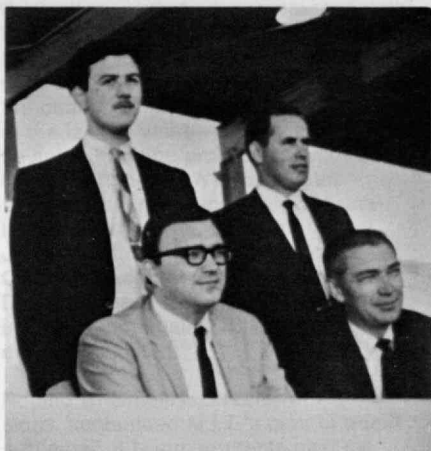
The crew around the pad was starting to

pull back, working by the light of the searchlights which played upon that rocket. It stood out against the sky, white with a few black markings on its side for easy visual tracking, and a small American flag painted on the base of the first stage.

After this sightseeing tour I went to bed early. I knew I'd have to be up early for the launch, and I was—at 4 a.m., which was far too early—and drove out to the press site at LC 39. This is a grandstand three and a half miles from Pad A, across the road from the Launch Control Center. There is no blockhouse for Saturn launches; the firing room is located three and a half miles from the pad, just across the road from the open-air press site. The check-out procedures are automated—the booster is watched from the firing room itself, and all spacecraft data are sent on a coaxial cable another five miles or so back to the Manned Spacecraft Operations Building (M.S.O.B.). For the last eight hours of the countdown, while the rocket is being fueled, no one should be closer than 13,500 feet.

The grandstand began to fill, and I saw C. Stark Draper, '26, Director of the Instrumentation Laboratory, talking to some of his engineers in their seats. "Doc" had been in France 36 hours before but had flown back to the United States and down to the Cape for the launch. Although his status entitled him to a seat in the "V.I.P. Room" in the Launch Control Center, he was outside at the grandstand because he thought the view was better from there. He took my picture, told me he'd try to arrange for me to see the M.I.T. graduates who are astronauts if any were around, and buzzed off. I sat down to watch the rocket.

The countdown grew shorter, finally the engines ignited at the appropriate moment, and the rocket got ready to move. I repeat, got ready. It takes about nine seconds for the engines to build up full thrust, and when lift-off finally comes, the rocket's motion is almost sluggish. N.A.S.A.'s official press kit claimed that at 736 feet, 11 seconds into the mission, the vehicle



The Tech's News Editor (left, rear) poses with Instrumentation Laboratory engineers awaiting the launching of Apollo 6 at Cape Kennedy: (left to right) Harry H. Movitz, '65, Romilly Gilbert, and Norman E. Sears, '52. (Photo: Charles S. Draper, '26)

speed would be two (count them, two) miles per hour. I estimate that it's more like 20, but that is still very slow. Some 130 decibels were recorded at the press site, but most of the noise was pitched at about five cycles per second and merely shook the grandstand hard. The rocket itself appeared balanced on a large glare spot, until I put my sunglasses on. The Polaroid film in them cut out enough of the glare so that I could see the shock pattern in the engine exhaust—something you can't see on photographs.

After the first seconds the ship started really moving. You can follow it part way by its contrail and then, if you're lucky, keep watching on binoculars. I lost sight of it when it was 70 nautical miles down range and 20 miles high. By that time the pad in front of you has stopped smoking and all that anyone at the Cape can do is hope that the mission goes as well as the lift-off.

#### Action on the M.I.T. "Hot Line"

In this case, all didn't go well. Part way through their burn, two of the five engines on the second stage shut down. The vehicle went into a good orbit even so, however, ready to finish its mission.

The mission plan now called for two parking orbits, followed by a restart of the third stage (S-IVB), which was one of the primary objectives of the mission. The S-IVB was to place the spacecraft in a simulated translunar orbit, with an apogee of 279,000 nautical miles. The moon, however, was somewhere else in the sky, since no one wanted to hit it on this flight.

After the S-IVB burn, the spacecraft, controlled by the guidance computer designed and programmed by the Instrumentation Laboratory, was to separate the spacecraft from the booster third stage, and fire its own motor—the Service Propulsion System (SPS), to lower the spacecraft's apogee to about 15,000 miles. Following about five hours of coast, the SPS would fire again to speed up the Command module before re-entry for a test of the heat shield.

Unhappily, the mission was somewhat different from the planned one.

When the time came for the S-IVB to restart, it didn't. Because this particular article could only attempt restart once, Mission Control in Houston sent a command to the spacecraft guidance computer to separate the spacecraft from the booster, and fire the S.P.S. to attain the 15,000 nautical-mile orbit. This was done, and, under its own power, the spacecraft attained an orbit with an apogee of 15,292 nautical miles. This maneuver left the spacecraft with 23 seconds of fuel aboard and an unfavorable angle and speed for its re-entry five hours later in the mission.

Some rather interesting action now took place. John E. Miller, S.M.'53, Deputy Associate Director of the Instrumentation Laboratory, and Wallace E. Vander Velde, Sc.D.'56, Professor of Aeronautics and Astronautics, began to think about using the last remaining fuel to improve the re-entry. Dr. Vander Velde held that the 400 feet per second extra velocity which the remaining fuel could provide should be used at apogee. He calculated that with its addition to the spacecraft's speed there would be "more than enough to lift the spacecraft perigee clear of the atmosphere." Mr. Miller, meanwhile, was holding a fast conference with the Instrumentation Laboratory people in Cambridge to get their views. He then called Houston and proposed the plan to N.A.S.A. It was rejected, however, because of uncertainty over the motor gimbal position and the difficulty of restarting the engine with so little fuel left. The last bit of fuel went unburnt, and N.A.S.A. made a prediction that the spacecraft would splash down 200 nautical miles short of its planned point.

To allow for this, the aircraft carrier *Okinawa* was sent downrange at her best speed, and all the aircraft were relocated prior to re-entry. Even so, it was expected that the carrier would be 100 miles from the spacecraft at splashdown.

#### Success Under Adversity

N.A.S.A., however, was embarrassingly wrong in its prediction of the impact. Re-entry was one degree off nominal,

and the re-entry velocity was some 4,000 f.p.s. too low. But the on-board guidance computer was still under orders to try to land in the old, pre-planned location. By tilting the capsule so as to achieve maximum lift, and skipping it once off the atmosphere, the computer put it down just 38 nautical miles from the co-ordinates which N.A.S.A. had designated before the rocket left the pad. This put the spacecraft about 80 miles behind the *Okinawa*, which had to turn around and sail back into the prime recovery area.

The engineers from M.I.T. who designed the guidance system and those from AC Electronics and Raytheon who built the hardware, were elated over the successful performance of their system under extremely adverse conditions. But N.A.S.A. was forced to declare the mission a failure overall because they had been unable to restart the third stage. (Later N.A.S.A. announced that the next Apollo flight, AS-503, will nevertheless be manned, and its crew will include Russell L. Schweikart, '56, and David R. Scott, S.M.'62.—Ed.)

But the failure wasn't important to me. I could still remember the vast inside of the Vehicle Assembly Building and the sight of the Saturn V climbing up through the clear Florida air.

Carson E. Agnew, '70, covered the Apollo 6 launch as News Editor of *The Tech*. His father is George E. Agnew, '35, of the Northrop Corporation, and James C. Agnew, Jr., '37, is an uncle; and Carson "has been raised on airplanes and spacecraft." His major at M.I.T. is aeronautics and astronautics with primary interest in systems analysis, but "I am planning on taking many courses outside my department, especially in computers and management," he says.

# Institute Review

How It "Feels" at Cape Kennedy

## Germeshausen Professorship

A gift of \$600,000 to endow a Germeshausen Professorship at M.I.T. has been contributed by Mr. and Mrs. Kenneth J. Germeshausen ('31), and John W. Gardner, the former Secretary of Health, Education and Welfare, will come to M.I.T. as the first Visiting Germeshausen Professor beginning in the fall. Dr. Gardner's acceptance of the appointment, he said, was the result of M.I.T.'s "resources, commitment, and very broad reach in the urban field." He noted that the Institute is developing new technological resources for the physical renaissance of our cities, and he emphasized that "its major focus is on such moral and human questions as goals, priorities and the motivation and development of leadership."

The Germeshausen Professorship, undesignated as to academic department, is intended to support M.I.T.'s strong interest in combining humanitarian advance with technological progress. Howard W. Johnson, President of M.I.T., said in announcing the professorship and its distinguished first occupant that "the addition of Dr. Gardner to the faculty will strengthen substantially the Institute's resolve and contribution in the complex fields of urban affairs. He brings to us a unique background of teaching, foundation experience, and high public service. Throughout his career," Mr. Johnson said, "Dr. Gardner has been able to translate his sense of idealism to issues of leadership in a democratic society."



K. S. Germeshausen



John W. Gardner

Mr. Germeshausen's gift was made in the conviction "that the welfare and the continued progress of the human race depend on the development of knowledge and on our ability to use that knowledge wisely and well. We have made great progress," he said, "in mathematics and the physical sciences; now, through interdisciplinary co-operation, we must make similar progress in the social sciences, the humanities and the fine arts."

In accepting the professorship, Howard W. Johnson, President of M.I.T., noted especially that the Germeshausen gift gives the Institute "complete freedom to make appointments in fields that will support interdisciplinary teaching and research related to science and engineering on the one hand and to the social and management sciences on the other. The ways in which man lives, the physical and sociological ways in which he relates to his fellows, determine in large part what he can become. I believe that this professorship symbolizes a vital area of concern to which M.I.T. can address itself with singular effectiveness."

As Germeshausen Professor, Dr. Gardner will continue his present full-time service as Chairman and Chief Executive Officer of The Urban Coalition; he will begin his duties at M.I.T. on a part-time basis in the fall. Dr. Gardner, educated at Stanford University and the University of California, joined the Carnegie Corporation in 1946 and was its President from 1955 until joining the Cabinet in 1965 for his distinguished three-year term as Secretary of Health, Education and Welfare, a post he resigned in February, 1968.

Mr. Germeshausen is Chairman of the Board of E G & G, Inc. Since his graduation from M.I.T. he has served as a Research Associate and Research Affiliate in the Department of Electrical Engineering and as a staff member of the M.I.T. Radiation Laboratory during World War II before joining as one of its founders the partnership of Edgerton, Germeshausen, & Grier in 1934 and of E G & G, Inc., in 1947. He became President of E G & G, Inc., in 1954 and Chairman in 1965.

## Racism and the Community Conscience

The death of Martin Luther King, Jr., and its tragic aftermath led to an unprecedented sequence of stocktaking and commitment on the M.I.T. campus early in April, and the result may well have wrought permanent change upon the Institute's collegiate character. There was an official memorial service on April 5, a four-hour discussion of racism and its meanings in Kresge Auditorium on the morning of April 9 with an accompanying "exhibition" of M.I.T.'s social conscience on the plaza outside and afternoon "workshops" on racism in the Student Center, an abortive effort to celebrate the Academic Day of Conscience on April 15, and "Operation Target," a week-long effort from April 15 to 19 to enlist the entire M.I.T. community for service projects throughout the Cambridge and Boston area. Through all the planning ran a theme of co-operation and concern between the M.I.T. faculty, administration, and student government that may in itself have been one of the week's significant attainments.

Harold R. Isaacs, Professor of Political Science who was a longtime friend of Dr. King, said at the memorial service on April 5 that Dr. King's death was in one sense more lamentable than that of President John F. Kennedy: it was brought about by a "much more namable madness . . . that we have all experienced . . . that we all share in some way or other. The question now is what we do about it, each one of us beginning with himself."

Two panel discussions brought more than 1,000 members of the M.I.T. community to Kresge Auditorium on Tuesday morning, when classes were canceled from 9 to 1. Among the speakers on Racism in America and later on "Where Do We Stand?" (meaning M.I.T.'s position and potential): Philip Morrison, Professor of Physics, traced the history of the "profound meaning of polymorphism in man," predicted the eventual re-mixing of the races as a product of the machine age, and called for an approach to race problems "in cool reason and warm



dedication, so that we can proceed with hope."

Leonard J. Fein, Associate Professor of Political Science, commented on the change from "prejudice" to "racism" in the last 10 years—an admission, he said, that "the problem is embedded in our institutions. We support an institutional environment which brutalizes the Negro," he declared. Jerome Y. Lettvin, '47, Professor of Communications Physiology, said that Dr. King was "the man who voiced the universal 'no' against injustice, wherever it happened."

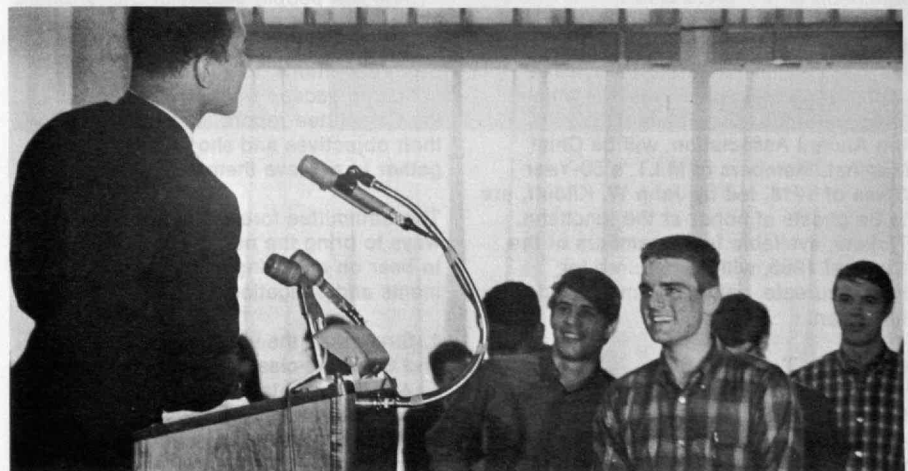
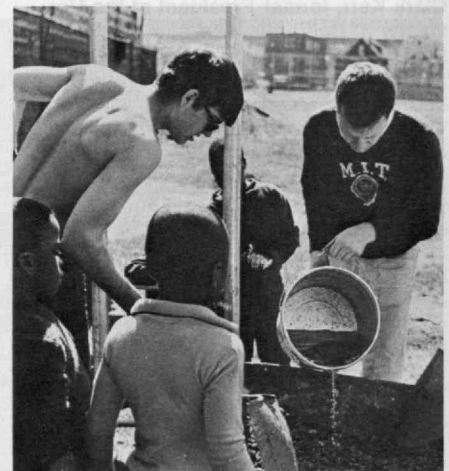
Roland B. Greeley, Director of Admissions, announced M.I.T.'s plan to admit a number of Negro students next fall who could not meet the usual entrance requirements, and he and Leon Trilling, Professor of Aeronautics and Astronautics, discussed other proposals such as a plan for a summer program for 20 to 30 Negro high school graduates as preparation for college careers, or a similar year-long plan for 100 students. To these plans came an answer from Shirley A. Jackson, '68, that whatever M.I.T. could do would be too little and too late; indeed, she asked, can society possibly change rapidly enough? In turn came a vigorous response from a Negro student in the audience, who charged that the whites present were hypocrites and that the white man doesn't really feel what he says about the black man.

Meanwhile, outside stood the most tangible expression of the Institute's grief and resolve—a memorial exhibit covering almost the entire plaza between Kresge Auditorium and the Student Center with black banners, boards displaying pictures and words of tribute, boards with paper for viewers to write their affirmations, tables and chairs for discussion, and booths for student committees. It was the work of Maria L. Kivisild, '69, Stephn A. Leff, '68, Arthur M. Stern, '68, and John H. Terry, '68, all architecture students, and of dozens of students and faculty who worked in shifts throughout Monday night to have the whole ready for the Tuesday memorial events.

*The Tech*, impressed by the scope and intensity of these Institute activities, nevertheless expressed its doubts that "any action remotely comparable to the hopes most of the audience carried into the . . . meetings will be forthcoming from the M.I.T. community; universities polarized around science are just not set up to undertake a commitment for social change of the magnitude needed to produce major effects." James G. Smith, '68, noted in *The Tech* that there are "only two courses in the entire Institute which deal actively with the problems of the center cities and of black Americans," and he called for a "tangible memorial for Martin Luther King: . . . a chair within the Political Science Department on precisely the problems of the black American and the American ghetto."

The death of Martin Luther King, Jr., stirred the M.I.T. campus into unprecedented introspection and resolve. Students and faculty joined to design and build in less than 48 hours an immense memorial on the West Campus plaza which became a focus for informal discussion as well as a formal tribute. Later more than 750 students and staff gave up a three-day weekend to work on Greater Boston community projects in Operation Target, and an overflow audience heard Muhammad Ali (Cassius Clay) say in the Sala de Puerto Rico that "the black men of America need a program for self-development. . . . We cannot just depend on the white to forever do for us that which we can do and should be doing for ourselves."

(Photos: Owen D. Franken, '68)



A very different expression of community commitment came a week later, when more than 1,000 M.I.T. students took time from their academic and collegiate pursuits to work on community projects for more than 130 service agencies throughout the Greater Boston area. "Operation Target" was organized by Thomas C. Woodruff, '70, Chairman, and other members of the M.I.T. Social Service Committee. Alfred S. Callahan, '71, who directed "Operation Target," said there was work for at least 1,800 students during the week. The city of Cambridge alone, he said, asked for 600 volunteers to work on playgrounds, settlement houses, and public works projects. One group traveled to Camp Massasoit in Plymouth, where they cleared the grounds and prepared the camp for summer activities for underprivileged children. Twenty students helped the American Cancer Society collate cancer kits each day; 15 students worked at the South End Neighborhood Action Center to set up a library and kitchen, and several Greater Boston Area Planning Action Councils used students to organize information programs and conduct surveys.

## Commencement 1968

The tradition of baccalaureate has been reinstated—after an absence of several years—in the commencement plans of the M.I.T. Class of 1968, whose graduation is set for Friday, June 7. Clark Kerr, former President of the University of California who now heads the Carnegie Commission on Higher Education, will deliver the baccalaureate address in Kresge Auditorium at 2:30 on Thursday afternoon June 6; his topic will be "The Legacies of Our Times."

Other commencement plans for the Class of 1968 follow the time-tested pattern of previous years: Joint Commissioning Exercise for R.O.T.C. graduates in Kresge on Thursday morning, June 6, at 11; a special entertainment given by members of the class for their parents and invited members of the faculty in the Student Center on Thursday evening; the graduation exercises in Rockwell Cage at 10 on Friday morning, June 7, followed by the commencement luncheon in the Great Court.

Howard W. Johnson, President of the Institute, will be the principal speaker at the graduation exercises, for which Gregory Smith, '30, President of the Alumni Association, will be Chief Marshal. Members of M.I.T.'s 50-Year Class of 1918, led by John W. Kilduff, are to be guests of honor at the luncheon. Tickets, available from members of the Class of 1968, will be required for baccalaureate, commencement, and luncheon.

## Chinese Technology

Plans are complete to accommodate over 2,000 alumni and their families for Alumni Homecoming Days on June

9 and 10 in Cambridge, according to Russell L. Haden, '40, Chairman of the 1968 Alumni Day Committee. The events will follow more than a dozen class reunions planned for June 8 and 9 at various resort areas south of Boston.

The day's highlight on Monday, June 10, will be an address and panel discussion—one of the first in recent years in the U.S.—on the scientific and engineering achievements of Communist China—the address by Jeffrey Oldham of the University of Sussex, England, with discussion by Max F. Millikan, Director of the M.I.T. Center for International Studies, and A. Doak Barnett, Visiting Professor of Political Science (from Yale University) at M.I.T., and others.

Other notable features on Monday include departmental presentations in the morning: "The Foods We Eat and Our Future" by Sanford A. Miller, Associate Professor of Nutritional Biochemistry; "Thought-Responsive Artificial Limbs" by Robert W. Mann, '50, Professor of Mechanical Engineering; "The Prospects for Metal-Matrix Composites," by Russel C. Jones, Associate Professor of Civil Engineering; "External Support for Body Systems" by Kenneth A. Smith, '58, Associate Professor of Chemical Engineering; "Man and His Brain" by Hans-Lukas Teuber, Professor of Psychology; and "Putting the Laser to Work," by Robert B. Williamson, Assistant Professor of Civil Engineering.

## Moral Responsibility

A program for "substantial commitment to community service, making effective use of the vast talents and resources that M.I.T. is capable of focusing on community problems" has been presented to the faculty by a faculty-student-administration Committee on Community Services, and the M.I.T. faculty has created a Community Service Fund to support Institute activities to "promote equality of opportunity and strengthen mutual understanding and co-operation between the Institute and the neighboring communities."

"There are people nearby in Cambridge, in Roxbury, and elsewhere in the Boston area who are struggling to improve their living conditions, to get a decent education, to escape from poverty," says the Committee report. "We subscribe to their objectives and should work together to achieve them."

The Committee foresees immediately two ways to bring the new Fund's resources to bear on emerging social commitments and obligations:

1. Strengthen the various tutoring and Saturday-class programs conducted by M.I.T. students for underprivileged children by providing academic work in learning processes and educational methods; a seminar in the subject will

be given under the Committee's auspices next fall.

2. Provide substantial financial support for on-going social services conducted by students and staff.

In addition, the Committee has proposed other Institute activities, including:

1. Make a deliberate effort to place disadvantaged and unemployed workers in Institute jobs and to provide training programs for employees and potential employees who will benefit from them. (Only 254 of the Institute's 8,770 employees are Negroes, according to the Committee.)

2. Use M.I.T.'s leverage as a major factor in new construction in Massachusetts to assure Negroes and other minority-group workers more places in contractors' work forces.

3. Insist that the suppliers of materials and services with whom M.I.T. deals provide job opportunities for minority groups.

4. Increase on-campus student housing so as to reduce the competitive pressures for low-income housing in Boston and Cambridge.

5. In programs for the acquisition and management of real estate, work with the Cambridge Model Cities planning group and "avoid taking action that will further reduce the supply of low-income housing in Cambridge."

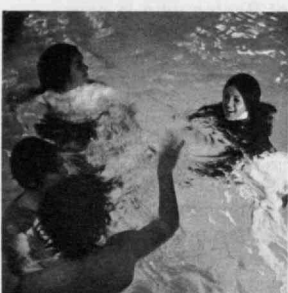
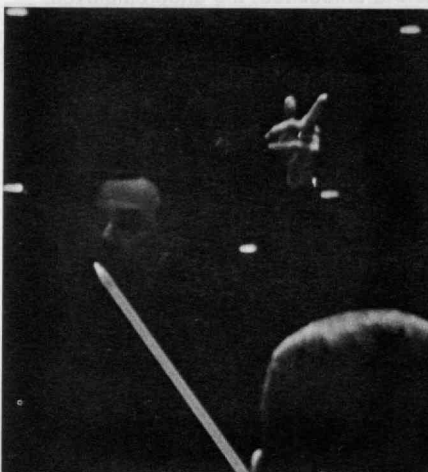
6. Modify M.I.T. admissions policies by making "greater efforts to identify and recruit promising students whose previous educational opportunities have been limited," and by providing these students with adequate financial support and tutoring or other special guidance if needed. (Of M.I.T.'s 3,860 undergraduates, only 22 are Negro Americans, according to the Committee.)

7. Invest M.I.T. funds so that they will serve as capital to support inter-racial housing, co-operative low-income housing, and ghetto-area business enterprise.

## "Incredible" Rehearsals

The unique experience of "living" music for 24 hours a day came to nearly 75 members of the M.I.T. Symphony Orchestra during a four-concert mid-western tour early this spring. It was an intense and rewarding week, and upon his return one of the orchestra's members said he realized he had "completely forgotten that he is an Institute student." Martha Elliott, music critic of the *Sun-Telegram* of Richmond, Ind., said the audience there had "a fresh look at music, a new conception of 'technology,' and two hours of pure enjoyment." David M. Epstein, Associate Professor of Music who is Conductor of the Orchestra, says the group will never be the same; he spoke to the





Music gave members of the M.I.T. Symphony a whole new way of life during a one-week tour of the east and midwest this spring. One member of their Earlham College audience wrote of the "Joy of performance by amateurs whose skill is so good that . . . they approach greatness," and the students themselves described with enthusiasm "'the cohesive force of playing together night after night without diversions.'" There were rehearsals and impromptu musicales, too. (Photos: Andrew C. Goldstein, '69)



Review of "the cohesive force of playing together night after night without diversions," the enthusiasm and "keen mindedness" of the students' "incredible" rehearsals.

The Symphony's program, repeated at Montclair (N.J.) State College, Dennison University, Earlham College (Richmond, Ind.), and George Williams College (Downers Grove, Ill.), included music by Rossini, Schoenberg, Carl Nielsen (Concerto for Clarinet and Orchestra, in which Ray Jackendoff, graduate student in linguistics, was soloist) and Brahms (Second Symphony). In between, in addition to air or bus travel, there was recreation and sightseeing ("I'll remember that day in Chicago for a long time—there's an awful lot there.")

The Montclair concert was sponsored in part by the M.I.T. Club of Northern New Jersey and the Downers Grove concert by the M.I.T. Club of Chicago. There was special interest in the concert at George Williams College because this was the first appearance of a symphonic group in the College's new Lowrey Center, which was built with strong support from F. Richard Meyer 3d, '42, and for which George P. Morrison's ('39) office of Turner Construction Company was general contractor. Both were at a dinner of the M.I.T. Club of Chicago preceding the M.I.T. Symphony concert on March 29.

## Art and Science Joined

A unique confrontation of distinguished artists and physicists (see *Trend of Affairs*, p. 49) marked the dedication in March of two new M.I.T. enterprises—the Center for Advanced Visual Studies under the direction of Gyorgy Kepes, Professor of Visual Design in the Department of Architecture, and the Center for Theoretical Physics, of which Herman Feshbach, Ph.D.'42, Professor of Physics, has been named Director. Jerome B. Wiesner, Provost, said the purpose of the joint dedication was "to encourage a dialogue between artists and scientists, who have more in common than is generally recognized."

The Center for Advanced Visual Studies occupies the building on Massachusetts Avenue formerly housing the Tech Store of the Harvard Cooperative Society, which has been extensively remodeled to provide studios and workshops. The space is planned especially to make possible work on large-scale environmental forms in which it is hoped scientists and engineers will participate, using light, film, and electronics. The Center for Theoretical Physics comprises a section of the Eastman Laboratories in the main building group, remodeled to provide an atmosphere insulated from the "institutional bustle." There are deep carpets, restrained lightning, and harmonizing colors for walls, furniture, and decoration.

To nearly 1,000 dedication guests, Howard W. Johnson, President of M.I.T., said the "amazing" event "allows us a rare opportunity to celebrate the wholeness of man, his learning, his experimental approach to life, his appreciation of what he is and what he may become." In a sense, he said, both are related through modern technology, which has freed both art and science through new methods and materials "to give greater scope and means for exploration." James R. Killian, Jr., '26, Chairman of the Corporation, noted at the dedication luncheon that the "symbiotic relationship between art, science, and engineering was built into M.I.T. from the beginning." The joint event, he said, represented the Institute's search for a new way to strengthen the alliance.

## Boston Urban Coalition

When 300 Greater Boston civic leaders met to form the Boston Urban Coalition early this spring, they were told by voices from the audience, "You can't tell black people what's good for them" . . . "We want to get away from the plantation attitude" . . . "You can't be telling Roxbury what to do." But James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation who opened the meeting, told the group that "we need to develop further and mobilize more effectively the resources of the whole community in support of constructive and responsible plans for action in such areas as employment, housing, and education.

"We need also," he said, "to find ways to draw more effectively on the great pool of human resources we have in Greater Boston and from among organizations, groups and individuals in the core neighborhoods."

The chairman of the meeting, Robert E. Slater, President of the John Hancock Mutual Life Insurance Company, paid tribute to Dr. Killian for taking the initiative last fall with John F. Collins, former Mayor of Boston who is now Visiting Professor of Urban Affairs at M.I.T., to develop the Urban Coalition leadership in Boston.

## Government of and for the People

While America sets out to improve its cities and lives of those who live there, let it bring into urban government the people it serves. "We have moved governmental systems which work in small towns into our cities, where they do not work," Paul Parks, Director of Boston's Model Cities Program, told members of the Alumni Council on March 25. "The structure of the modern urban center is too complicated" for people to participate; we must change the system so that it can be more responsive and responsible to the people, he said.

The Model Cities Programs, said Mr. Parks, are distinct because they represent a new form for urban action—"the

first program that emphasizes people planning for themselves." While the format does not by itself assure the participation of all urban residents in a model cities area, the program at least provides the opportunity. It is an admission, said Mr. Parks, that we cannot at any time plan for the "ultimate" plan, because "people cannot conceive of their life circumstances" a decade hence. Instead, he said, the Model Cities Program asks people to examine themselves and make their choices on the basis of what they want "at this stage."

Thus the Model Cities Programs, Mr. Parks said, promise to reach one group of urban residents who have been heretofore untouched: the underemployed, jobholders who earn too much to qualify for welfare assistance but not enough to make decent lives for themselves. Such people, said Mr. Parks, "ought to be able to live on \$5,000 without seeing themselves as underprivileged."

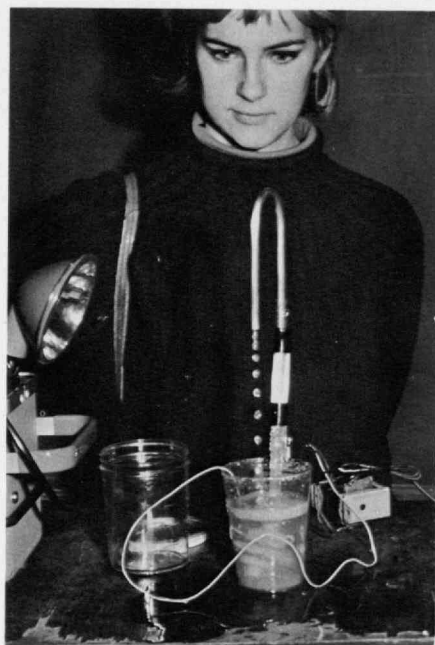
## Individuals Noteworthy

**James R. Killian, Jr., '26**, Chairman of the M.I.T. Corporation, was the recipient of a George Foster Peabody Award for "distinguished achievement by television and radio." One of the personal awards, "among the most prestigious in broadcasting" was bestowed on Dr. Killian. He was head of the study group of the Carnegie Commission of Educational Television whose suggestions led to the establishment of the Corporation for Public Broadcasting. **Albert G. H. Dietz, '32**, Professor of Building Engineering, was named the New England Engineer of the Year by the Engineering Societies of New England, in "recognition of his accomplished works as well as his character." According to the *Journal of Engineering Societies of New England*, ". . . he has pioneered in varied projects . . . and published papers in several countries of Europe . . . His work belongs to the world. . . ." The 1968 David Richardson Medal of the Optical Society of America has been awarded to **Harold E. Edgerton, Sc.D.'31**, Institute Professor and Professor of Electrical Measurements, for his contributions to the field of applied optics. Dr. Edgerton's development of the electronic stroboscope is the basis for most stop-motion photography today.

**John F. Elliott, Sc.D.'49**, Professor of Metallurgy, was chosen by the American Institute of Mining, Metallurgical and Petroleum Engineers to be one of five of the Institute's Fellows. Dr. Elliott was cited for "his many contributions in a broad spectrum of research related to iron and steelmaking." **Sergio P. Fubini**, Visiting Professor of Physics and **Raymond G. Herb**, who spent several years working on radar at the M.I.T. Radiation Laboratory, were honored by the American Physical Society for their work in nuclear and mathematical physics.

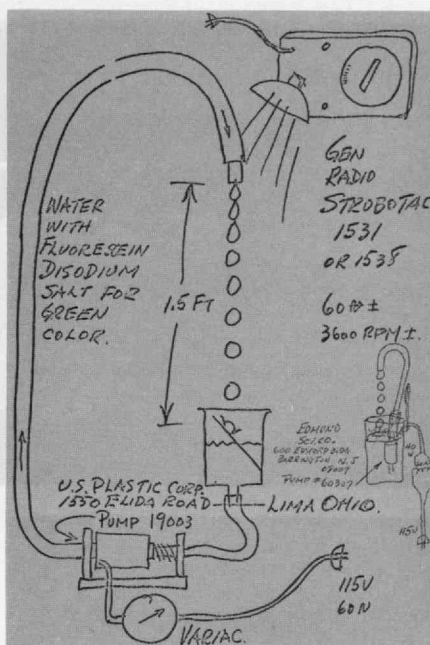
# Strobe Probe

Harold E. Edgerton, Sc.D. '31



Here is a family build-it-yourself project for the summer. When you have finished this little device, you can adjust pump and light to make the water seem to be flowing either up or down—or standing still.

The pump sends the water in pulses or drops at exactly 60 per second. To have the drops move up at two-second intervals, set the stroboscope for 60.5 cycles. The flash can be seen, too! (Two models are shown; the pumps are inexpensive.)



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The Program for Senior Executives in M.I.T.'s Sloan School of Management reaches the milestone of its twenty-fifth class

# More of the Forest, Less of the Trees

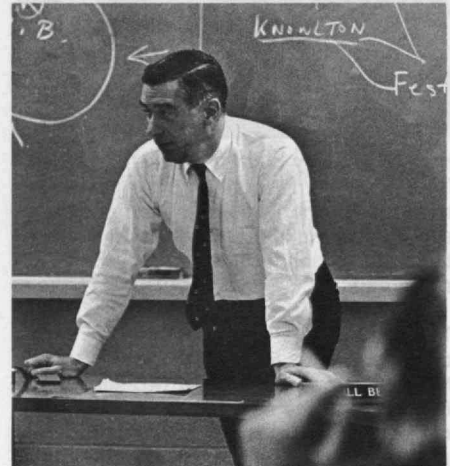
"You can't have an 'in' basket and be very reflective," was the way Nicholas Johnson, Commissioner of the Federal Communications Commission, put it for members of the Spring, 1968, session of M.I.T.'s Program for Senior Executives in Washington in March. Though his remark was directed to the responsibilities and frustrations of executive life in the nation's capital, it struck directly at one of the principal reasons for M.I.T.'s sponsorship of the Program of which this spring's session was the twenty-fifth.

Fourteen of the 25 executives in the spring, 1968, class came from Canada and overseas, evidence of a growing trend for applicants from foreign companies and from U.S. companies doing business abroad. (To date, nationals of 20 countries have completed the Program in M.I.T.'s Sloan School of Management.) The new arrivals began their experience with a week of residence at M.I.T.'s Endicott House devoted entirely to the study of individual and group behavior—in practice. In other words, the behavior of the participants themselves was the subject, with the main focus being "a combination of learning about groups and building learning groups," in the words of Mason Haire, Professor of Organizational Psychology and Management. Clearly, this learning group involvement has had a lasting impact on every group of Senior Executives, for it is an effective introduction to each other for men whose backgrounds and instincts are more competitive than co-operative.

## New Knowledge and Current Research

Most of the rest of the Program's nine weeks is devoted to classroom work on the M.I.T. campus, mostly in the Sloan School. A typical day includes classes from 9:15 to 3:15, a luncheon seminar, and several hours of reading assignments for the following day. Members of the Program live at Endicott House in Dedham which becomes for the period of the program each fall and spring a sort of private executives' club.

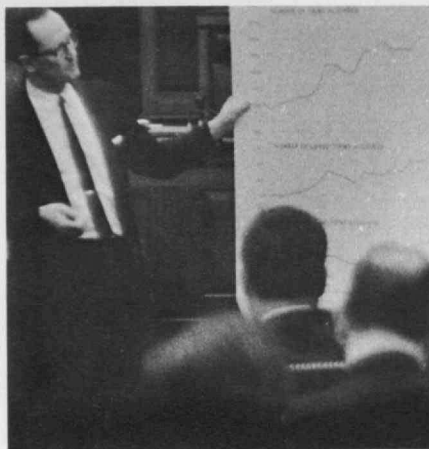
Peter P. Gil, Associate Dean for Executive Programs of the Sloan School



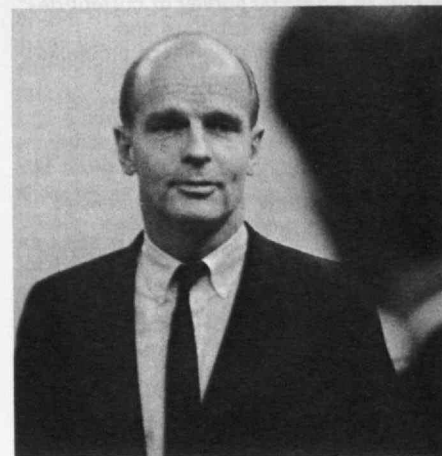
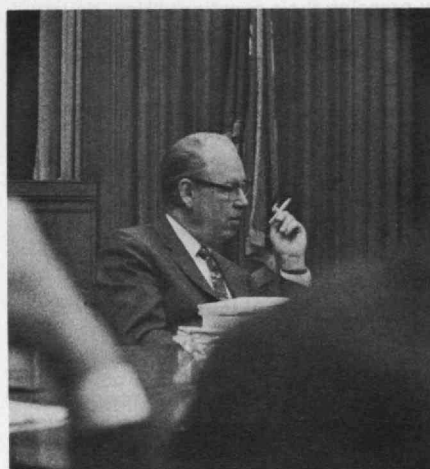
For nine weeks, members of the twenty-fifth Program for Senior Executives attended classes and seminars with M.I.T. faculty: (top to bottom, left to right) Everett E. Hagen, Professor of Economics; Richard S. Morse, '33, Senior Lecturer in Management; Peter P. Gil, Associate Dean for Executive Programs; and John F. Collins, Visiting Professor of Urban Affairs.



# Puzzle Review



A four-day Washington briefing session for the twenty-fifth Program for Senior Executives included conversations with: (top to bottom, left to right) Willard Mueller, Economist with the Federal Trade Commission; Representative Leslie C. Arends of Illinois; Joseph A. Beirne, President of the Communications Workers of America; R. Duane Saunders, Assistant to the Secretary of the Treasury (Debt Management); Nicholas Johnson, Commissioner of the Federal Trade Commission; and Senator William Proxmire of Wisconsin.



of Management, describes the Senior Program as "an inter-related, interdisciplinary study of management functions, supporting elements, and the economic, social and technological environment of an organization. The emphasis," he says, "is on new knowledge, current research and future trends. A substantial part of the time is spent on statistical and mathematical analysis."

In organization studies, according to Professor Haire, there is discussion of such issues as "an open system view of the organization, the process of socialization and career development, internal entrepreneurship, the innovative process, the helping relationship, and communications in the managerial process." There are eight sessions covering labor relations and personnel administration, including the personnel function in management, the role of unions and trends in collective bargaining, wage determination and administration, the Scanlon Plan, and public policy questions.

Management information and control, one of the largest single components of the Program, co-ordinated by Zenon S. Zannetos, Ph.D. '59, Professor of Management, covers accounting measurements, managerial requirements for information in planning and control, and issues of centralization and decentralization. Marketing sessions focus especially on systems analysis as a tool for market planning and control as part of a general survey of current developments in "the structure and solution of policy management problems in marketing," according to Arnold E. Amstutz, '58, Associate Professor of Management.

#### The Omnipotence of Politics

A special feature is a 3½-day intensive briefing on the federal government in Washington, arranged for the Program by the Advanced Study Program of the Brookings Institution. The 25th Program for Senior Executives encountered this briefing just three days after the most critical period of the international gold crisis in March, and their meetings on federal economic policy had a special meaning. But the focus

of the Washington experience was more on attitudes and contrasts than on facts and figures—the contrasts between the many elements that together make up the federal system and the personalities who find places in it.

In an advance briefing session, Walter G. Held of the Brookings Institution described the federal government as a "rational, conservative" decision system. "Compromise is an expression of reason and rationality," he said, and "alliance-building, compromise, and bargaining are part of the process of determining what is the public interest." Unfortunately, Mr. Held agreed, such a conservative system tends to depress innovation, and members of the Program summarized their reaction by pressing their question: "How do you get anyone to survive this system for \$28,500 a year?"

In Washington, members of the Program found political reality omnipresent; it is "axiomatic," they were told, that the Congress feels executive expenses are too high; politically, it is "desirable" to reach the Moon in this decade, and nobody is facing up to the prospect that we may not succeed. Even the number of federal employees is political; so is the budget, determined by "what the President thinks Congress will accept." But there is "less political pressure in the use of anti-trust laws than anyone outside would imagine." The Council of Economic Advisers finds it a "very resilient and strong economy"; the U.S. Treasury sees the need for a lower federal deficit as "crucial"; but the national debt serves a useful function in our economy because "it gives us a chance to control some things" in the government's effort to operate monetary, fiscal, and tax policy; and the Department of Commerce emphasizes that there is something "economically unsound about restricting imports when the cost of foreign goods is lower than that of domestic goods." From a bureaucratic point of view, "the thing to have is a friend in the White House."

The federal government is less a frustration than a "great intellectual challenge" to a professional administrator. But

a Congressman complained that "it is immensely difficult to find time to do what is expected of you. We in the Legislative Branch must somehow find a better way to deal with the flow of information, or we'll lose the rest of our initiative to the Executive." Another emphasized that Congress is amply equipped to analyze problems but has no mechanism for synthesizing them.

#### Broadening and Stretching

At the end of each session of the Program for Senior Executives, its members have been asked to evaluate their experiences, and the result is usually enthusiasm which is more than simple courtesy. But many of its participants discover that the impact of the Program becomes clearer to them after at least six months back on the job. Fourteen per cent call it "one of the most useful contributions to my career as a manager," 37 per cent more agree that it was "very important," and 45 per cent more say it was "definitely helpful." The alumni rated the faculty as the single most important element in the success of the Program, then the association with one another, the assigned readings, and the sabbatical aspects of getting away to read and think, in that order.

William F. Pounds, Dean of the Sloan School of Management, emphasizes that the benefits of the Program for Senior Executives move in both directions—to the members of the Program and to the faculty and the School. The Sloan School's is a single faculty, and the experiences of the Senior Executives, says Dean Pounds, flow out of their classrooms into other classrooms and into research projects of the School.

Of 565 living alumni of the Program for Senior Executives (not counting those of this spring's 25th group), 16 are now company presidents, eight executive vice presidents, 92 vice presidents, 16 directors of research, 45 general managers, 11 managing directors, and 12 corporate directors of the board. Some of them may now be seeing more of the forest—and less of the trees—which is the goal expressed for his own experience by one member of the 25th Program at the halfway mark.

# Puzzle Review

Allan J. Gottlieb, '67

Last month while writing my column I was fighting a "life-and-death" battle with mononucleosis, which may explain the exceptionally low quality of that installment. A few weeks later I went home for Easter vacation. Of course, when my mother found out about "the disease," she was ready to hospitalize me—for up to six years, it seemed. Since this may be a problem encountered by others, I suggest that anyone involved look at *Reader's Digest* (a recent issue) for an article which puts mononucleosis in its place. Without this article, I would have been in bed my entire vacation and my mother wouldn't have slept a wink.

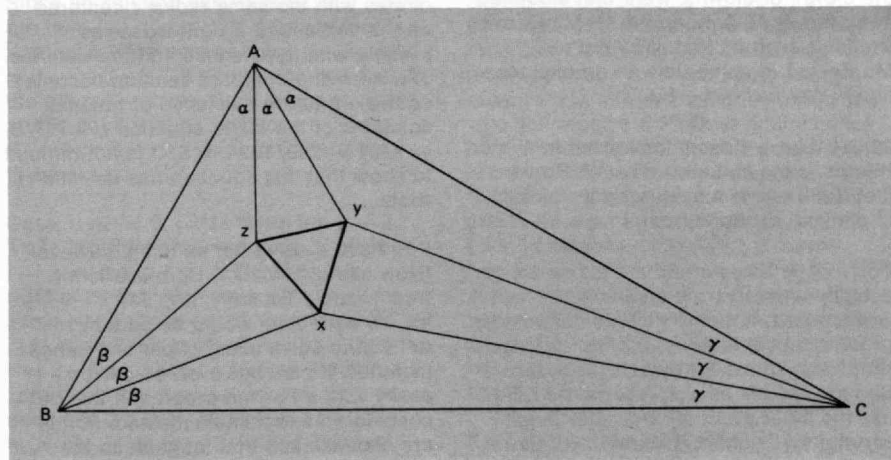
Next month (July) I will print no new problems. Instead, solutions to problems in both April and May issues will be given. This month's new problems will be answered in the first issue of *Technology Review* in the fall.

## Problems

In problem 17 (Technology Review for February) you were asked to show that a certain triangle was equilateral. Now Eric Rosenthal, son of Meyer S. Rosenthal, '47, has a related question:

**35** Given, as in the drawing below: We know from problem 17 that triangle XYZ is equilateral. Show that its sides are of length  $8R \sin \alpha \sin \beta \sin \gamma$ , where R is the perimeter of triangle ABC.

The next two problems come from



Douglas J. Hoylman, '64. The first one, he says, came out of an elementary calculus book, but four graduate students in mathematics required several hours to solve it. "Well, we solved it," he writes, "but our method used only algebra and trigonometry, and the problem appeared in a section on differentiation. Can anyone find a method of solution that uses calculus?" The problem:

**36** A quadrilateral is inscribed in a circle such that one side is a diameter of the circle and the other three sides have lengths 1, 2 and 3, respectively. Find the length of the diameter to three decimal places.

Doug Hoylman's second problem:

**37** Arrange six line segments of equal length in the plane to form eight equilateral triangles.

Russell A. Nahigian, '57, sent a long list of problems which will keep us going well into next year. One unusual one is:

**38** Given four colored cubes described as follows:

	Front	Right	Back	Left	Top	Bottom
Cube 1	Green	Blue	Red	White	Red	Red
Cube 2	White	Green	Green	Red	White	Blue
Cube 3	Blue	Red	White	Blue	Green	Green
Cube 4	Red	White	Blue	Green	Red	White

The problem is to pile the blocks one above the other so that each face of the pile shows all four colors. (Cubes are helpful but not necessary to solve the

problem.)

John Reed, '43, sends a puzzle which he believes has never been printed:

**39** Find  $n$  such that  $n^4 + n^3$  is a 10-digit number in which each digit is used only once.

## Speed Department

From Mr. Nahigian:

**SD13** Given  $VI = II$ . Move one stick to make the equality true. There are two solutions, and  $V \neq II$  is not one of them!

Leon Sutton, '62, suggests:

**SD14** John Dow usually arrives at the railroad station at 3 o'clock. His wife is always there to meet him and take him home (she always leaves the house at the same time and drives at a constant 30 m.p.h.) One day John's train arrives early, at 2:30, so he starts walking toward home. His wife, who left at the usual time, meets him on the way, picks him up, and they arrive home 10 minutes earlier than usual. When did his wife pick him up?

## Solutions

**20** If  $x$  and  $y$  are positive numbers with  $x > y$ , is  $x^y$  greater than, equal to, or less than  $y^x$ ? Let  $x > y \geq 0$ , show that  
a) if  $y \geq e$ , then  $x^y < y^x$   
b) if  $x \leq e$ , then  $x^y > y^x$   
c) if  $y < 1$  and  $e \leq x$ , then  $x^y > y^x$   
d) if  $1 < y < e$ , then there exist infinitely many values of  $x > e$  such that  $x^y < y^x$  and infinitely many values of  $x > e$  such that  $x^y > y^x$  and exactly one value of  $x > e$  such that  $x^y = y^x$ . And show that a corollary of this is the well-known fact that there is exactly one solution of  $x^y = y^x$  for  $x$  and  $y$  integers,  $0 < y < x$ .

As I had suspected (feared), Professor Martin's problem was not too easy. After all, you don't become Chairman of the Mathematics Department by peddling grapefruit. Only two solutions were received. One, by William T. Moody, '31, included a geometric interpretation of  $y^x = x^y$ ; the other, reprinted below, came from Mr. Hoylman:  
Let  $f(x,y) = y \log x - x \log y$ . Then



$\partial f / \partial x = (y/x) - \log y$ , and  $\partial f / \partial y = \log x - x/y$ .

a) If  $y \geq e$ , then  $\log y \geq 1$ , and  $x > y$  gives  $y/x < 1$ , so  $\partial f / \partial x < 0$ . Hence for fixed  $y$ ,  $f(x, y)$  is a decreasing function of  $x$ . Then, since  $f(y, y) = 0$ , we have  $f(x, y) < 0$  for  $x > y$ , i.e.  $y \log x < x \log y$ , and since  $\exp$  is an increasing function,  $x^y < y^x$ .

b) If  $x \leq e$ , then  $\log x \leq 1$ , and  $x > y$  gives  $x/y > 1$ , so by a similar argument  $f(x, y)$  is a decreasing function of  $y$ , so  $f(x, y) > 0$  for  $y < x$ , so  $x^y > y^x$ .

c) Let  $y$  be fixed. By elementary calculus (I quote Mr. Rosenthal's solution to problem 5), the maximum value of  $x^{1/x}$  occurs for  $x = e$ . Hence  $e^{1/e} > y^{1/y}$ , or  $e^y > y^e$ . On the other hand,  $\lim_{x \rightarrow \infty} (y \log x - x \log y)$

$$= \lim_{x \rightarrow \infty} x[y(\log x)/x - \log y]$$

$= -\infty$ , so for sufficiently large  $x$  we have  $y \log x < x \log y$ , or  $x^y < y^x$ . So, by continuity, there is at least one  $x$ ,  $x > e$ , such that  $x^y = y^x$ . Suppose there is more than one such  $x$ . Then there must be at least three (the curve starts above the  $x$ -axis and ends below it, so must cross it an odd number of times), or, equivalently, at least three solutions of  $f(x, y) = 0$ , where  $f$  is as above. This means there must be at least two solutions of  $f_x(x, y) = 0$ . But the latter equation has the unique solution  $x = y/(\log y)$ . Contradiction. To find a solution of  $x^y = y^x$  in positive integers,  $x > y$ : by a) we must have  $y < e$ , i.e.  $y = 1$  or  $2$ . Clearly there is no solution with  $y = 1$ , so we must have  $y = 2$ . Then  $x \geq 3$ , so  $x > e$ , and by c) the equation has exactly one solution in real numbers. But we know that it has the solution  $x = 4$ . Hence this is the only solution in integers.

21 The "Whitfield Six": Given

♠ —  
♥ 6 3  
♦ A 9  
♣ 8 2

♠ 7 3  
♥ —  
♦ K 10  
♣ 9 5

♠ 5 4  
♥ —  
♦ Q  
♣ J 10 6

South to lead, hearts trump; North-South

♠ 6 2  
♥ —  
♦ 8  
♣ 7 4 3

to make all the tricks against any defense. The following comes from Peter J. Davis, Jr., whose father graduated in 1948:

Maxwell Smart might have called the solution the old end-game cross-dummy double-squeeze, but if you don't believe that try ruffing a spade in the dummy and leading the remaining trump. A club discard by East makes South's ♣ 6 good for the last trick, and a spade discard (with South dropping the ♦ Q) squeezes West into deciding whether to make the ♠ 5 good, to give the dummy two diamond tricks, or to give the last trick to the ♣ 8. This leaves East with his best and only remaining choice, to part with the ♦ 8, upon which South drops the ♦ Q and West the ♦ 7; any other discard by West provides South with a clearer path to success. South then cashes the dummy's ♦ A, and East has to make up his mind whether to give South a club trick or to allow his partner to decide which suit to lose the trick in.

The following observation is due to Ted E. Davis, '66:

It is noted that there are 10 clubs showing on the table, the missing cards being the ♣ A, ♣ K, and ♣ Q. This situation could occur only if someone reneged when clubs were played or, if clubs were not played, the three clubs were sluffed on a heart lead (assuming there were no reneges).

And Lee H. Wilson, a University of Michigan journalism student, is puzzled: What is impossible is figuring out who the clown, or clowns, were that sloughed away the ♣ A, ♣ K, and ♣ Q. My wife wouldn't even do that. Why not ask Mr. Zaklad to come up with an explanation? (You just did.—Ed.)

22 Let  $V$  be a closed convex set in a Hilbert space  $H$ . Let  $x \in H - V$ . Prove that there exists a unique  $y \in V$  which is of minimal distance from  $x$ .

For a while I was afraid a physics major actually answered my challenge; in fact, I was worried: not only was his uniqueness proof identical to mine, but his existence proof was "better"! It would work for Banach spaces as well (i.e. he did not use the inner product). But after much scrutiny by Michael R. Gabel, '65, flaws

were discovered. A result which Mr. Sutton simply asserted is in fact the heart of the existence proof. Here is his letter: Let  $R$  be the supremum of the radii of open balls about  $x$  which have a null intersection with  $V$ . (By open balls of radius  $r$  I mean, of course, the open set  $\{z: \|x - z\| < r\}$ . Since  $V$  is closed (and the space is complete and the parallelogram law holds for inner product spaces and etc.—Why don't you physics majors stick to naming new particles and leave Hilbert spaces to real men, i.e. mathematicians?—Ed.),  $\exists y \in V$  s.t.  $\|x - y\| = R$ .  $Y$  is unique, for suppose  $\exists y_1, y_2 \in V$  s.t.  $\|x - y_1\| = \|x - y_2\| = R$  ( $y_1 \in V$  and  $y_2 \in V$ ). Consider  $y' = y_1 + \lambda(y_2 - y_1)$   $= (1 - \lambda)y_1 + \lambda y_2$  ( $0 \leq \lambda \leq 1$ ).

Since  $V$  is convex,  $y' \in V$ . ( $Y'$  lies along the line joining  $y_1$  and  $y_2$ .) It is easy to show that

$$\|x - y'\|^2 < R^2 \text{ if } y_1 \neq y_2: \|x - y'\|^2 = \|x - y_1\|^2 - \lambda^2 \|y_1 - y_2\|^2 - 2\lambda \operatorname{Re}(x - y_1, y_2 - y_1). \quad (1)$$

In  $\|y_1 - y_2\|^2$ , substitute  $y_2^2 = y_1^2 + 2\operatorname{Re}(x, y_2) - 2\operatorname{Re}(x, y_1)$ , obtained from  $\|x - y_1\|^2 = \|x - y_2\|^2 = R^2$ . Expand both terms on the right-hand side of (1) to obtain:  $0 \leq \|y_1 - y_2\|^2 = 2y_1^2 + 2\operatorname{Re}(x, y_2) - 2\operatorname{Re}(x, y_1) - 2\operatorname{Re}(y_1, y_2)$   $= 2\operatorname{Re}(x - y_1, y_2 - y_1)$ .

Therefore (1) becomes  $\|x - y'\|^2 - R^2 = (\lambda^2 - \lambda)\|y_1 - y_2\|^2$ . If  $y_1 \neq y_2$ , then, by choosing  $0 < \lambda < 1$ , the right side is negative, so  $\|x - y'\|^2 < R^2$ , which contradicts the assumption that  $R = \sup$  of the radii of the open balls which have null intersection with  $V$ . Therefore  $y_1 = y_2$ .

23 Given three co-planar circles with centers  $c_1, c_2$ , and  $c_3$  radii equal to  $r_1, r_2$ , and  $r_3$ , respectively. Choose three points, one on each circle, and label them  $A, B$  and  $C$ . The problem is to find the maximum and minimum areas of such a triangle  $ABC$ , in terms of  $r_1, r_2$  and  $r_3$  and  $c_1c_2, c_2c_3$  and  $c_3c_1$ .

Mark H. Yu, '70, the proposer, offered a year's subscription to *Tech Engineering News* for correct solutions, and it looks as if he was taking no chances. Russell L. Mallett, '57, shows the impossibility of a general construction as follows:

There is no general method of constructing the triangle of maximum or minimum area. By considering the case of three circles with the same radius  $r$  centered on the vertices of a right isosceles triangle with hypotenuse  $4r$ , the existence of a ruler-and-compass solution becomes equivalent to the existence of rational solutions of the cubic equation  $z^3 - z^2/8 - z/64 - 289/1024 = 0$ . It is not difficult to show that this equation has no rational roots.

I do have a computer solution, however. (How about it, Mark?) Here is a letter from Francis T. Leahy, Jr., '33: Mr. Yu's problem would be certainly difficult to solve using paper and pencil methods. It can, however, be solved easily with a Fortran program if this be considered a legitimate method. Points are chosen such that tangents to the

[illegible]

The only correct solution is from the proposer, Kenneth W. Dritz, '66: I offer a derivation of two solutions for  $R = 4$ , one for  $R = 5$  and a parametric one for each  $[R > 6]$ . The derivation is the proof that no other solutions exist. Since the length of  $N$  is equal to the number of 0's in  $N$ , plus the number of 1's in  $N$ , and so on up to  $R - 1$ , the sum of the digits must be exactly  $R$ . Now let us assume we have a solution in which there are  $i$  non-zero digits ( $n_0 = R - i$ ). Since no solution can have  $n_0 = 0$ , there are then  $i - 1$  non-zero digits to the right of  $n_0$ . The sum of these  $i - 1$  digits is  $R - n_0 = i$ . Therefore, one is a 2 and the other  $i - 2$  are 1's. It is seen easily at this point that no solutions exist for  $R = 2$  or  $R = 3$ . For  $R > 3$  there are three cases:

solution is 2020.

Case 2:  $n_1 = 1$ . Since there are  $i - 2$  1's to the right of  $n_0$  and just one 1 in  $N$  (which happens to be right of  $n_0$ ),  $i - 2 = 1$  and  $i = 3$ . The 2 to the right of  $n_0$  can only be  $n_2$  (if  $n_j = 2$  for some  $j > 2$  there would have to be 2  $j$ 's in  $N$  in addition to the 2 and the 1, contradicting  $i = 3$ ). Then  $n_0 = 2$  for the same reason as before. Since  $2 = n_0 = R - i = R - 3$ ,  $R = 5$  and one solution is 21200.

$\overbrace{R - 7 \text{ 0's}}$

Case 3.2: Only one of the 1's in  $N$  is to the right of  $n_0$ . Then  $n_0 - 1$ ;  $i - 2 = 1$  and  $i = 3$ . Since  $n_1 = 2$ ,  $n_2$  can't be 0. Nor another 2 (as before). Hence,  $n_2$  is the remaining 1. Since  $1 = n_0 = R - i = R - 3$ ,  $R = 4$  and one solution is 1210.

We have exhausted all the possibilities. So there is no solution for  $R = 6$ . John's solution, 6210001000, for  $R = 10$ , falls out of Case 3.1.

7 R. Robinson Rowe, '18, has extended further the solution of this problem, calling attention to his earlier solution of part (a):  
My solution was  $y = e^{Dx}$ , where  $D = 0.567143290409784 \dots$ . Testing this,  
 $y' = De^{Dx} = Dy$   
 $f(x-1) = e^{D(x-1)} = e^{Dx}e^{-D} = e^{-D}y$   
If  $y' = f(x-1)$ ,  $Dy = e^{-D}y$   
and  $D = e^{-D}$ ,  
which determines  $D$  as given above.

```

graph TD
    A["505 FEBRUARY"] --> B["Twelve plus its square plus a score"]
    B --> C["Plus three times the square root of four"]
    C --> D["Divided by seven"]
    D --> E["Plus five times eleven"]
    E --> F["Let me times itself and no more"]
    F --> G["DEBORAH FAIRBANKS  
(Daughter of an engineer)"]
    G --> H["MAKE LOVE  
NOT WAR"]
    H --> I["Thank you"]
    J["University of  
GAITHERSBURG"] -.-> G
  
```

73

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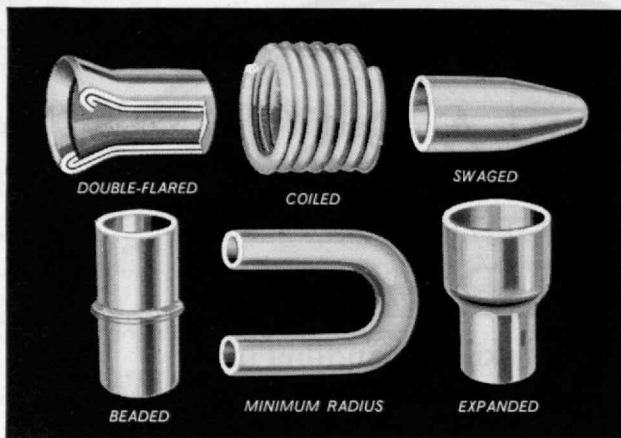
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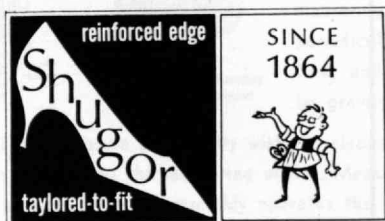
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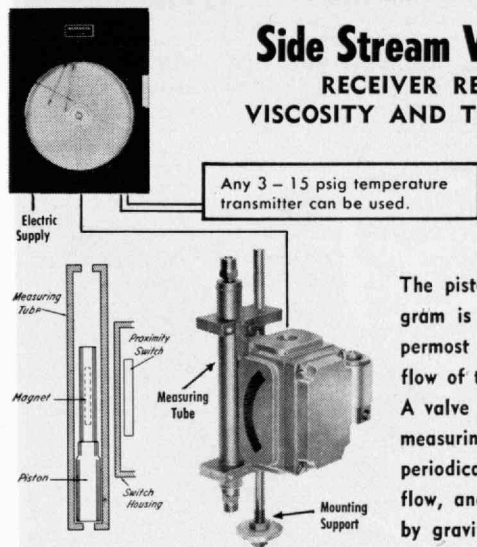
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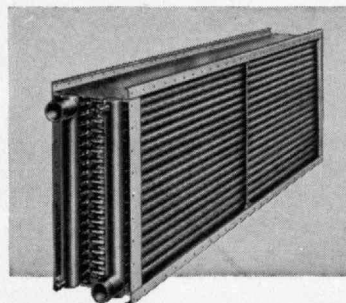
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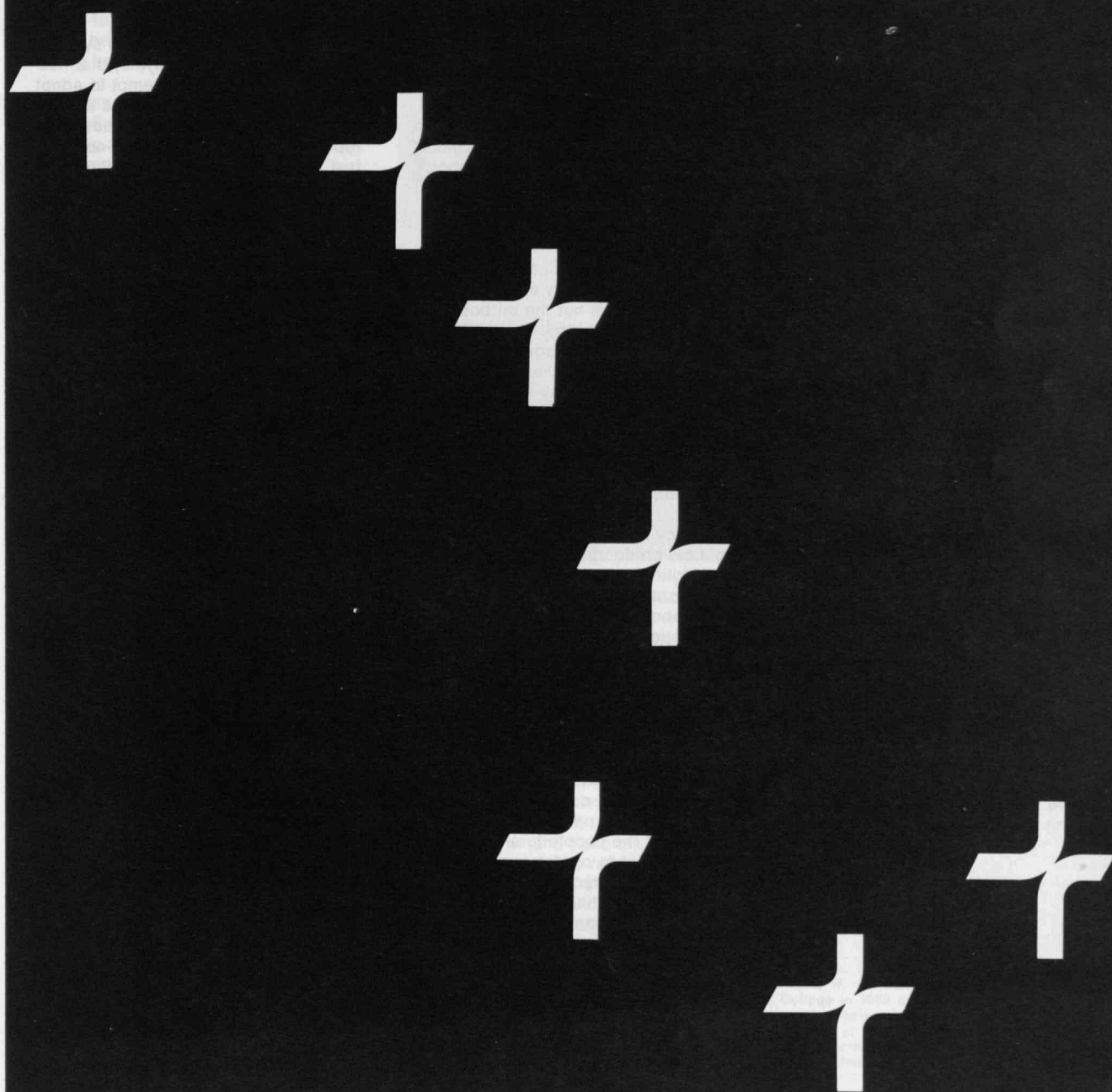


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# Alumni Review



# The Experiment With Democracy In Village India



Democracy, as an institutional form and as a political method, is always an experiment—a bet ultimately resting upon certain presuppositions about the nature of the man governed.

In India the experiment is especially bold. The outcome impinges not only on the power balance of Asia and the fortunes of India's hundreds of millions. It also bears on the proposition that democracy is a way of political life that is relevant for the low-income nations of the world, all of which aspire to rapid economic development and most of whose social and cultural fabric is in many ways antithetical to the basic postulates of democracy.

The odds are great. To catalogue all the reasons why democracy should not succeed in India is not the purpose here. Let it suffice to note that India is a nation divided in language, religion, ethnic background and cultural heritage; a nation challenged by extremist parties of the left and the right; a nation sharing miles of a tense border with China; a nation where the per capita income is barely \$60; and a nation in which three in four cannot read or write.

Democracy has emerged in India less as a political credo springing from the intermingling of ancient tradition and contemporary demand than as a strategy of development deliberately chosen by an enthusiastic elite. The question to be asked is whether it is reasonable to expect impatient new states, anxious to speed up all the processes of economic and social development, to rely upon democratic institutions and procedures. There are many conditions for the success of an experiment with democracy. In the Indian case, one of the most critical is political participation—involvement of the people to an extent and depth sufficient to render representative institutions both practicable and viable. While political participation alone is not a sufficient condition for democracy, it is certainly a necessary one. Political life is the doing of the politically active; in this sense a people is never truly self-governing. But it is in the nature of democracy that a legitimate and energetic interest may make itself felt somewhere along the road to public policy.

For government to be democratic it must be responsive; for government to be viable it must be effective. In rural India these semantics are more than abstract; civic initiative must be cultivated while developmental programming must be coordinated.

Central to the experiment is a system of village councils (*panchayats*) that has been instituted in the attempt to adapt the old political forms of caste association to the new political methods of representative politics. These councils rest for authority on popular vote, and their powers are sufficient to make them the fulcrum of village politics. As the principal distributor of whatever scarce resources are available, the councils provide the setting for the interplay of interests that is "politics."

The role of caste is yet significant; individual loyalties are often delimited by considerations of caste and, depending upon one's position in the operating caste hierarchy, caste identification may be a vehicle or a barrier to political influence. The location of a new road, the installation of an electric pump, the placement of a public drinking well—such are the fare of the councils. These are decisions bearing directly on the life of the village. Thus, while much of political life takes place outside of the new *panchayat* institutions, it almost always takes place in terms of them.

## Participants and Nonparticipants

The political participant is obviously the individual; and what it is that differentiates participant from nonparticipant was the focal question of my doctoral thesis in M.I.T.'s Department of Political Science. My effort to tie these abstractions down with some hard data included a year spent in four villages in the northwestern state of Rajasthan. About 350 interviews with people selected randomly from the adult male population of the four villages were coupled with several life-history case studies to provide some insight into the nature and process of political involvement. Respondents ranged from completely illiterate nonparticipants bound to the world of their fathers to highly articulate and secular participants.

As anticipated, the villagers who participated most in community affairs were the most educated and better off economically and those from the higher and politically dominant castes. Yet looking behind these attributes, when education, economic well-being and caste were held constant, significant differences in degrees of political involvement were still apparent. It was to these differences that various attitude questions were directed. My problem was to discover and analyze some of these more subtle individual differences.

### Sensitivities to Politics and Power

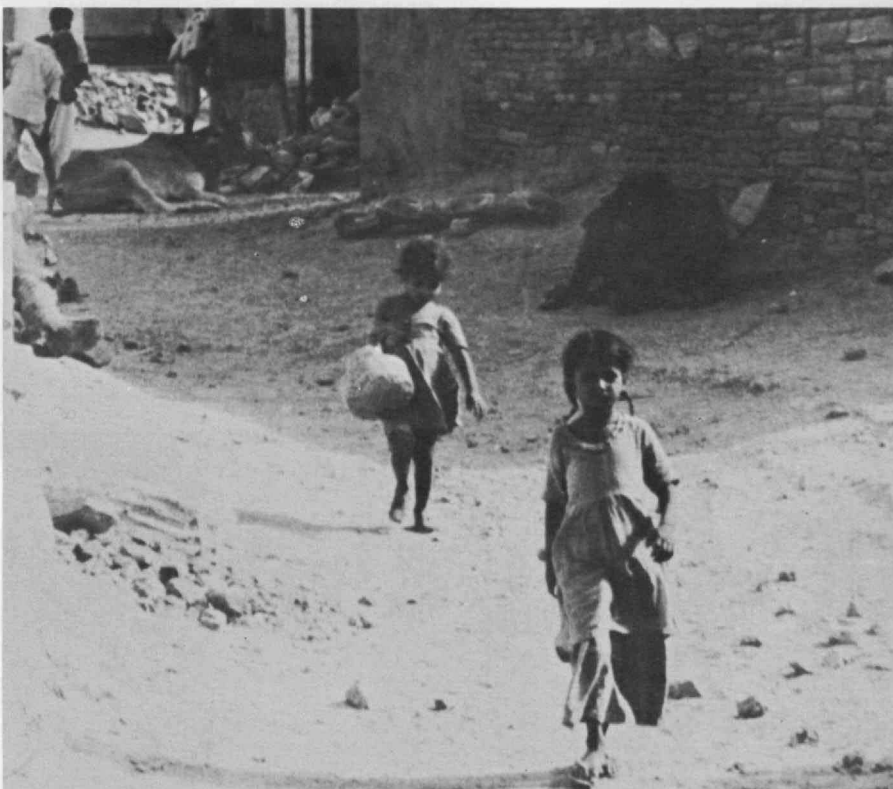
Relative to nonparticipants, participants are more concerned about more things. They tend to feel that their life's experience may be enriched with deliberate effort. This sense of the potentiality of objects is more than a matter of exposure alone; an individual may become "aware" of something, say an iron plow, but may not sense it as potentially available to him. It may be something to which he attributes little significance, or it may be simply beyond his grasp.

Participants and nonparticipants differ only slightly in the kinds of things for which they strive; the difference is that participants attribute political significance to more aspects of their lives. Participants see in "politics" an instrument for their own well-being. Participants perceive a greater interdependence between their own personal situation and the state of affairs in their village.

Participants appear more aware of the contingencies that may bear upon their ability to act effectively in the future. The things participants strive for are realistically within reach, and their assessment of what the future portends is conservative. Nonparticipants are relatively unrealistic, not attuned to what is potential and the effort required to turn potentiality into actuality.

Participants are more prone to feel that the future can be anticipated—if not planned for. By contrast, nonparticipants resign themselves to fate in the view that what lies ahead is "in the hands of God." Poverty for the nonparticipant is the working of fate; for the participant it is the product of insufficient initiative and hard work.

Participants see the political process as accessible to them. Participants recall instances in which their efforts to influence the process were fruitful and continue to feel that the process may bend again under their weight. Participants tend to feel that "politics" as such is not a bad thing. They sense increased interest in political affairs in their villages and regard this as a favorable sign. Less participant villagers see in politics a way of life that is only divisive and harmful. Participants are more willing to accept conflict and disagreement as a natural adjunct of village life.



The more participant perceive authority in the village as diffused. They do not regard political power as the exclusive possession of members of the village council and are more willing than nonparticipants to see a sizable number of men sit on the council. But accompanying this view is a critical and skeptical attitude toward political leadership. In comparison to the more participant, the less participant are trusting and overly reliant upon the judgements and actions of village influentials. As such the relatively non-participant villagers are less concerned about how the council operates than about what it does. Participants are much more concerned about the "how" of decision making; they are exceedingly sensitive to abuses of power, partisanship, and irregularities in procedure.

That growing political participation in the villages of India will abet economic

A catalogue of all the reasons why democracy should not succeed in India would include poverty, illiteracy, national division, extremism, and international instability. Under these conditions is it reasonable, the author asks, for an impatient new state, anxious to speed up all the processes of economic and social development, to rely upon democratic institutions and procedures? (Photos: Albert H. Cantril, Jr., Ph.D.'66)

development is yet a moot question. But nonetheless it is an assumption upon which India's planners have hung many hopes. As one village leader told us, "Without taking an interest in politics, one gets left behind in the development race. The life of an individual and his family are more than ever dependent upon the development of the village—and the development of the village is not possible these days unless people take an interest in politics."

Albert H. Cantril was graduated from Dartmouth College in 1962 and received his Ph.D. in political science from M.I.T. in 1966. A former member of the White House Staff and Consultant to the Bureau of the Budget, Dr. Cantril is now Special Assistant to William P. Bundy, Assistant Secretary of State for East Asian and Pacific Affairs.



# Alumni Review

## Alumni Clubs: "Sparkling Resources"

An alumni club program must be a "many-splendored thing," and it is the club president who must set its tone, Gregory Smith, '30, President of the Alumni Association, told nearly 60 officers of M.I.T. clubs attending the Association's first conference for club officers in Cambridge on April 5. M.I.T. clubs, he said, "have suddenly achieved new purpose . . . and new stature. All the sparkling resources of M.I.T. are now behind you." Reviewing these resources in an informal speech following the club officers'

dinner, Howard W. Johnson, President of M.I.T., discussed current developments in the Institute's five schools. Science, he said, remains "the core of the Institute," not in its details but in its meaning and method. Engineering represents man's hopes for converting the discoveries of science to practical use of men, and "I have never been so high on the future of engineering at M.I.T.," President Johnson said. He cited the new field of ocean engineering as a special example of the fruitful link between engineering and science in Cambridge. Finally, said President Johnson, "the M.I.T. leader of the future will have built in the whole

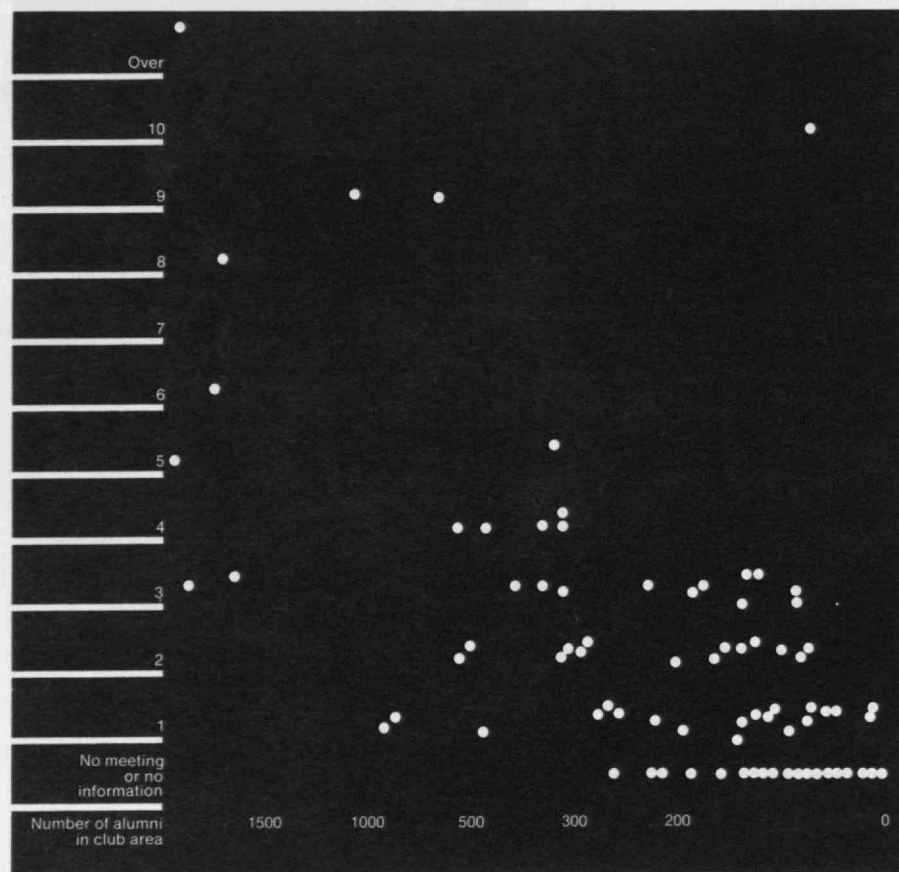
of the learning and yearnings of man, for he must understand excellence in whatever field he operates."

Earlier in the Session, G. Peter Grant, '35, Director for Clubs, described the Alumni Association's plans for increasing support of club activities. There are now 97 alumni clubs, he said, including 22 overseas. The Alumni club Advisory Board has recommended that faculty be asked to speak at 30 clubs next year, and two faculty members will be asked for the 10 largest clubs; some of these faculty club visits will include afternoon meetings with high school students with the assistance of members of the Educational Council. In addition, undergraduate students and student groups and members of the Alumni Association staff will make more than 30 club visits in 1968-69, Mr. Grant said.

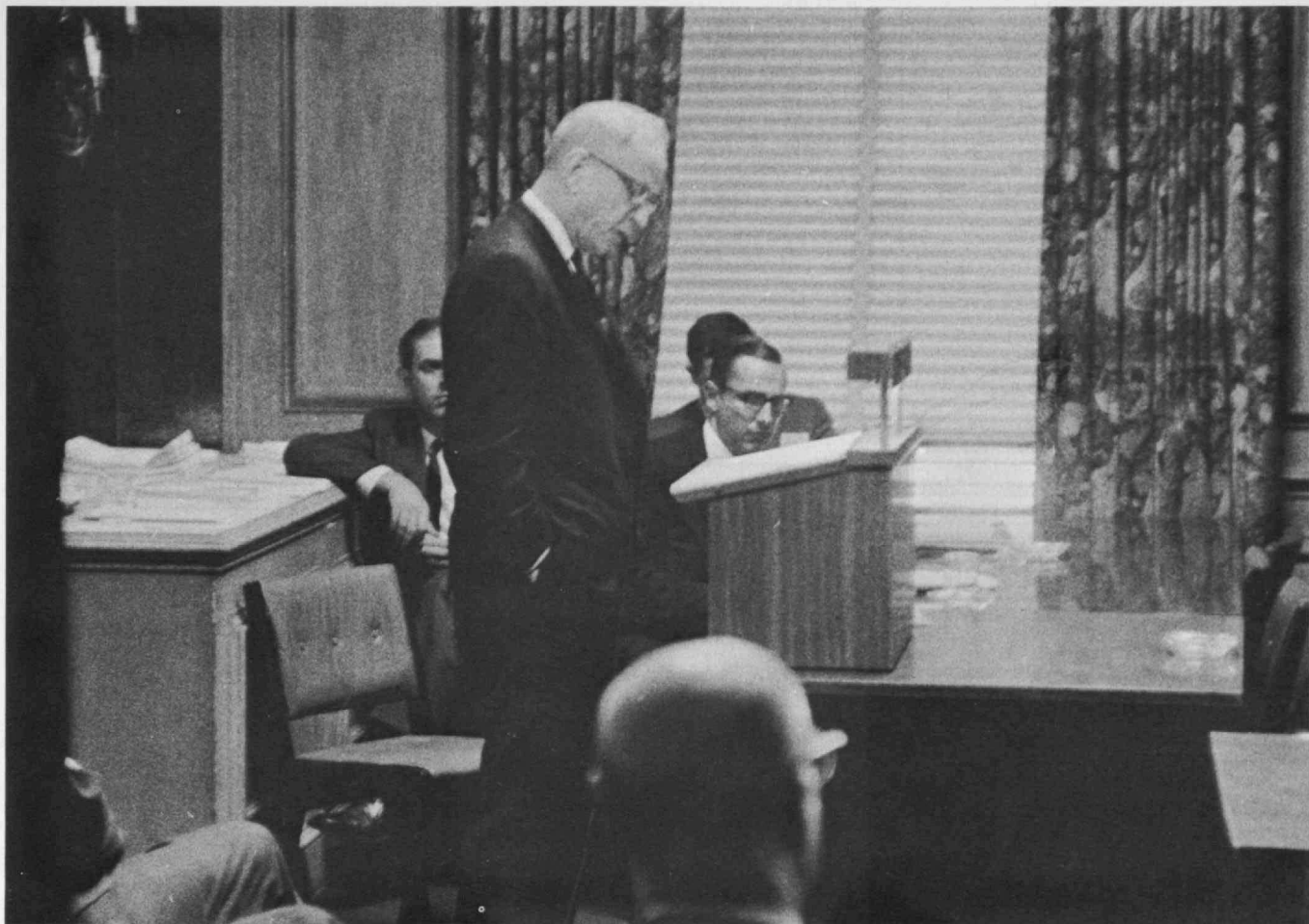
William S. Edgerly, '49, Chairman of the Alumni Club Advisory Board, used club officers to consider the needs of alumni in their areas as well as the needs of the Institute in planning their programs, and he asked for broader involvement in program planning through the use of committees and boards of directors. Local Educational Council and Alumni Fund chairmen should be members of the boards of directors, he said.

## Deceased

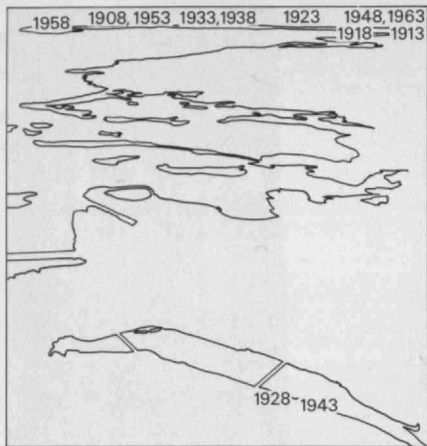
Charles W. Berry, '95, March 30\*  
Ruben E. Bakenhus, '96, October 6\*  
Lewis W. Riddle, '99, March 18  
Archibald H. Briggs, '02, January 24  
Harcourt W. Bull, '04, March 3  
Emmet Dwyer, '05, December 12  
James M. Gaylord, '07, February 23\*  
Edward H. Wing, '07, March 17\*  
Ralph Hilscher, '10, December 17  
Máirtín F. Tiernan, '10, May 3\*  
Michael W. Murray, '12, January 28  
F. W. Blackwood, '13, January 22, 1967  
Te-Ping Hsi, '14, March 16\*  
John A. Roberts, '14, September 3  
Ralph W. Mendelson, '15, April 5  
Carlton S. Ayer, '18, November 25  
Lewis J. Atwood, '19, November 3  
Newell A. Grover, '21, January 12  
Samuel H. Miller, '21, March 19\*  
Marion S. Dimmock, '22, February 18\*



Of the 75 M.I.T. alumni clubs (not including those overseas), 36 serve 87 per cent of the alumni; 18 clubs serve areas with between 100 and 200 alumni, and 21 clubs serve fewer than 100. The chart shows that club activity correlates only poorly with the number of M.I.T. alumni in the club area.



"The 20th century must be the century in which man sees a relevance to all that goes on in civilization," Gregory Smith, '30 (top), President of the Alumni Association, said to 60 M.I.T. club officers in Cambridge this spring. And our loyalty to the Institute, he said, should stem from "a realization of what M.I.T. is doing to produce men and women who understand the complexities of our society." Among participants in the first club officers' conference were (left, above) William S. Edgerly, '49, Chairman of the Alumni Club Advisory Board; Howard W. Johnson, President of the Institute; and Harold W. Fisher, '27, General Chairman of the M.I.T. Alumni Center of New York. Robert L. Lichten, '43 (right), President of the M.I.T. Club of Dallas, was among those participating in the discussion.



This will be "M.I.T. country" on June 8 and 9, when twelve classes hold reunions on the M.I.T. campus and at Cape Cod resorts (left to right, Provincetown, Chatham, Harwichport, Bass River, Osterville, Edgartown, and Falmouth). This remarkable photograph was made in the fall of 1967 10,000 feet over Cambridge on infrared aerographic film by Aerial Photos of New England.





Earl R. Thomas, '22, March 7\*  
 Carl de Ganahl, '24, March 23  
 Edwin R. Buchman, '25, February 6  
 Earle D. Lissner, '26, March 27\*  
 C. Herman Olander, '26, March 15\*  
 James B. Bell, '27, July 7, 1967  
 Arthur A. Nichols, '28, March 30\*  
 Fred L. Lamoreau, '38, March 27\*  
 Frank K. Slason, '44, December 31  
 Donald J. Fritch, '50, February 12  
 \*Further information in Class Review

#### Reunions: Coming Back to Cambridge

Class reunions will bring more than 1,500 alumni to M.I.T. and resorts on Cape Cod during the week-end of June 7 to 10, and there will be special honors for the 25-, 40-, and 50-year classes of 1918, 1928, and 1943 and for Edward S. Taylor, '24, Professor of Flight Propulsion, who retires from full-time teaching at the end of this year.

Earliest arrivals will be the Class of 1918, who will be specially honored at the Institute's Graduation Exercises on Friday, June 7, and at the Commencement Luncheon immediately afterwards. Then they will adjourn to the Wianno Club in Osterville, Mass., where sightseeing tours of Cape Cod in an aircraft provided by Carleton W. Blanchard, '18, will highlight the week-end festivities. By Sunday evening they will be back in Cambridge for a reception at the home of President and Mrs. Howard W. Johnson and dinner in McCormick Hall.

Reunion plans for the Class of 1928, whose accommodations will be in McCormick Hall on the campus, begin with an informal reception given by President and Mrs. Johnson on Friday evening, June 7. On Saturday the Class plans a reunion symposium at which Secor D. Browne, Associate Professor of Flight Transportation ("Air Travel of the Future") and Dr. Joseph H. Brenner of the M.I.T. Medical Department ("Pot, Acid, and Speed") will speak, and a luncheon at the M.I.T. Faculty Club with Dr. and Mrs. James R. Killian, Jr. ('26) as special guests. A shell named in honor of the late Ralph T. Joep, '28, will be christened at the Pierce Boathouse at 5 p.m. on Sunday, June 9.

The Class of 1943, meeting in Baker House for the week-end, will hold a symposium with Walter A. Rosenblith, Professor of Communications Biophysics, on Saturday morning, June 8; a noon reception by President and Mrs. Johnson, and a Walker Memorial Luncheon at which Mrs. Karl T. Compton, wife of the Institute's ninth President, will speak informally. Plans for Saturday evening include a gala dinner-dance in the Julius A. Stratton Building. Special entertainment will be provided throughout the week-end for children accompanying their parents at the 25th Reunion.

A reunion of alumni who have worked in the M.I.T. Gas Turbine Laboratory will provide a unique honor for the Laboratory's long-time Director, Edward S. Taylor, '24, on Saturday, June 8.

Speakers at a technical symposium in the afternoon will include Robert C. Dean, Jr. '48, President of Creare, Inc.; Charles S. Draper, '26, Director of the M.I.T. Instrumentation Laboratory; William R. Hawthorne, Sc.D.'39, Visiting Institute Professor (Mechanical Engineering); and John D. Stanitz, '42, of Cleveland, Ohio. Later there will be a reception and dinner in McCormick Hall with remarks by C. Fayette Taylor, '29, Emeritus Professor of Automotive Engineering at M.I.T.

One other informal reunion will occur on the M.I.T. campus over the week-end: the Class of 1952 will meet for dinner at the M.I.T. Faculty Club on June 7.

#### Alumni Calendar

**Cambridge**—class reunions on June 7-9 and Alumni Day on June 10.

**Cambridge**—Alumni Officers' Conference on September 6-7, 1968.

**Cambridge**—Alumni Seminar, a three day educational enrichment program for alumni, wives and faculty tentatively set for November 9-11, 1968.

Club picnics to introduce entering freshmen to undergraduates and alumni will be announced locally in several cities.

#### Dallas: The City in the Year 2000

The real problem of the modern city is not transportation, communication, design, housing, education, poverty—or all of these together. The heart of the issue is man's ability to work with his fellowman, to make his technology "man-compatible," to develop new arrangements by which "our intellectual and our industrial power can be translated into urban action."

This was the thesis—in some of their own words—brought to Dallas, Texas, by six members of the M.I.T. faculty speaking at the 1968 M.I.T. Southwest Regional Conference on March 30. More than 300 alumni and guests and 350 high school students and teachers from throughout the Southwest and Mexico attended the all-day meeting, arranged under the General Chairmanship of Jack C. Page, '48, with special assistance from Robert L. Lichten, '43, and Lee B. Freese, '58. The Honorable Erik Jonsson, Mayor of Dallas, was the day's guest of honor, and he called it "an exciting opportunity." The day's speakers included:

John F. Collins, former Mayor of Boston who is now Visiting Professor of Urban Affairs at M.I.T.: As the domestic and human problems of America have migrated to our cities, their solution increasingly becomes the responsibility of government at the federal level, and now "it is incumbent on us to reorganize federal aid on functional lines." The needs are for a system for federal support of plans developed on the basis of local decisions and priorities; for new corporate entities that will identify tasks and bring technology to bear on them. If we can bring just a fraction of our scientific capacity to bear on our cities," the year 2000 will be one of triumph—not despair.

Secor D. Browne, Associate Professor of Flight Transportation: As cities grow in size and complexity, transportation is a source of frustration and inefficiency—and so it is likely to remain. Aircraft will grow larger, and so will airports and the numbers of people using them, so the year 2000 "will still

see little old ladies in track shoes sprinting along moving sidewalks to catch connecting planes." No form of mass transportation will prove "serious competition" to the automobile, and the year 2000 will still find "solitary, free consumers sitting glumly . . . in traffic jams all over the world." Noise is and will remain "one of the key problems of all transportation systems," and even for the city of the year 2000 there will be "a very substantial residue of unpleasant noise disturbance."

Arnold E. Amstutz, '58, Assistant Professor of Management: The city is one of "the most formidably complex interactive systems that man can attempt to control," but concepts of systems analysis—"the examination of systems to distinguish their component parts in relation to the whole"—may open new ways of determining priorities and solutions. "Man can make the city responsive to his needs if he will structure his environment, establish explicit objectives and criteria of evaluation, and utilize the computer to synthesize and maintain a representation of the total environment."

John E. Burchard, '23, Dean Emeritus of the School of Humanities and Social Science: Diversity is a principal justification for a large city, and it must find ways of pleasing all kinds of people, catering to "high culture and low culture." Thus those who plan cities need a taste for fun and grandeur, for a city is "meaningless and indeed menacing" unless it provides all sorts of pleasures to all the senses.

Walter A. Rosenblith, Professor of Communications Biophysics: The modern urban crisis is the result of very rapid urban evolution overtaking the processes of biological evolution which are measured in eons. Man is today at a point in his history "where we have the power to do anything" we can imagine; "we are imagination-limited." Perhaps we must know more about man before we can resolve some of his problems. Is it possible that the brain—"the most complex and sophisticated product of biological evolution"—has analogues to the city? Can cities, like the brain, somehow learn to develop social processing and organizing power?

Howard W. Johnson, President of M.I.T.: The city is both structure and institution, and to improve the structure depends on improving the institution. The city must "build upon the natural interdependence of men . . . It should be an intense expression of the wholeness and integrity which men find in relationships with each other . . . One idea, advanced persuasively now, would save the city as a natural institution: let all of us join to provide the leadership that will originate, administer, and operate quickly a national program for building great cities." This is a visionary plan, but it takes into account the creativity of urban peoples.



Alumni from throughout the Southwest, leading citizens of the Dallas-Fort Worth area, and high school students from many Texas and Oklahoma points came to Dallas on March 30 for a convincing demonstration of M.I.T.'s power to envision "The City in the Year 2000." Howard W. Johnson (top), President of M.I.T., and John F. Collins (center, right), former Mayor of Boston who is now Visiting Professor of Urban Affairs at the Institute, received enthusiastic questions from high school students at luncheon; while (below) John E. Burchard, '23, Arnold E. Amstutz, '58, and Walter A. Rosenblith fielded questions from the audience with help from members of the conference committee. Jack

C. Page, '48, and Cecil H. Green, '23 (center, left), were General Chairman and Honorary Chairman, respectively, of the 1968 M.I.T. Southwest Regional Conference.

# SPECIAL REDUCED RATES FOR M.I.T. ALUMNI

## FOURTH AND FIFTH ANNUAL TOUR PROGRAMS—1968-1969

This unique program of tours is offered to alumni of Harvard, Yale, Princeton and M.I.T. and their families. The tours are based on special reduced air fares which offer savings of hundreds of dollars on air travel. The tour to India, for example, is based on a special fare, available only to groups and only in conjunction with a tour, which is almost \$400 less than the regular air fare. Special rates have also been obtained from hotels and sightseeing companies. Air travel is on regularly scheduled jet flights of major airlines.

The tour program covers four areas where those who might otherwise prefer to travel independently will find it advantageous to travel with a group. The itineraries have been carefully constructed to combine the freedom of individual travel with the convenience and saving of group travel. There is an avoidance of regimentation and an emphasis on leisure time, while a comprehensive program of sightseeing ensures a visit to all major points of interest. Hotel reservations are made as much as a year and a half in advance to ensure the finest in accommodations.

### THE ORIENT

#### 30 DAYS \$1549

**Mar. 23, Jun. 29, Sept. 21, 1968**  
**Mar. 22, Jun. 28, Jul. 26,**  
**Sept. 20, 1969**

1969 will mark the fifth consecutive year of operation for this fine tour, which offers the true highlights of the Orient at a sensible and realistic pace. Eleven days will be spent in JAPAN, divided between TOKYO, the ancient "classical" city of KYOTO, and the FUJI-HAKONE NATIONAL PARK, with excursions to NARA and NIKKO. Five days will be spent in HONG KONG and four in the fascinating city of BANGKOK. Shorter visits to SINGAPORE and the lovely island of FORMOSA complete the itinerary. Optional pre and post tour stops may be made in HONOLULU and the WEST COAST at no additional air fare.

A complete program of sightseeing will include all major points of scenic, cultural and historic interest. Features range from a tour of the canals and floating markets of Bangkok, an authentic Javanese "Rijsttafel" in Singapore, and a launch tour of Hong Kong harbor at sunset, to a "Mongolian Barbecue" in Taipei, and a trip on the ultra-modern 125 m.p.h. express trains of Japan.

Tour dates have been chosen to coincide with outstanding seasonal attractions in Japan, such as the spring cherry blossoms, the beautiful autumn leaves, and some of the greatest annual festivals in the Far East. Total cost is \$1549 from California, \$1719 from Chicago, \$1787 from New York.\*

### INDIA

Including NEPAL and PERSIA  
**29 DAYS \$1549**

**Aug. 3, Oct. 5, Oct. 12, 1968**  
**Mar. 15, Mar. 22, Aug. 2,**  
**Oct. 4, 1969**

An unusual opportunity to see the diverse and fascinating subcontinent of India, to-



gether with the once-forbidden kingdom of Nepal and the rarely-seen splendors of ancient Persia. Here is India from the mighty Himalayas to the palm-fringed Bay of Bengal: the great seaport of BOMBAY; the magnificent cave temples of AJANTA and ELLORA, whose thousand year old frescoes are among the outstanding achievements of Indian art; MADRAS, in the south; the great industrial city of CALCUTTA; a thrilling flight into the Himalayas to KATHMANDU, capital of NEPAL, where ancient palaces and temples abound in a land still relatively untouched by modern civilization; the holy city of BENARES on the sacred River Ganges; AGRA, with not only the Taj Mahal but many other celebrated monuments of the Moghul period such as the Agra Fort and the fabulous deserted city of Fatehpur Sikri; the walled "pink city" of JAIPUR with an elephant ride at nearby Amber Fort; the unique "lake city" of UDAIPUR, with its delicate white marble palaces; the great capital of NEW DELHI; and the fabled beauty of the VALE OF KASHMIR, surrounded by the snow-clad Himalayas. PERSIA (Iran) includes visits to PERSEPOLIS, the great royal capital of Darius and Xerxes in the 5th century B.C.; and ISHFAHAN, the fabled city of the 15th-17th century Persian Renaissance, with its palaces, gardens, bazaar, and famous tiled mosques. Outstanding accommodations include hotels that once were palaces of Maharajas and luxurious houseboats on Dal Lake in Kashmir. Total cost is \$1549 from New York (\$1599 in 1969).\*

### SOUTH AMERICA

#### 31 DAYS \$1599

**Jan. 18, Jul. 26, Oct. 18, 1969**

An original itinerary which takes unusually full advantage of South America's great scenic and cultural attractions. The trip descends along the West Coast, dominated by the towering Andes and filled with the churches and mansions of 16th and 17th century Spain, and returns through the modern cities and lush scenery of the East Coast. Stops include Spanish colonial QUITO, with the nearby Indian market at AMBATO and a drive along the snow-capped peaks of "VOLCANO ALLEY"; Pizarro's great viceregal capital of LIMA; the ancient city of CUZCO and the fabulous "lost city" of MACHU PICCHU; lovely SANTIAGO in Chile; cosmopolitan BUENOS AIRES, the continent's largest city; BARILOCHE, in the beautiful ARGENTINE LAKE DISTRICT; spectacular IGUASSU FALLS (largest in the world); the sun-drenched beaches of RIO DE JANEIRO (considered by many the most beautiful city in the

world); the quaint and historic town of OURO PRETO (so revered by Brazilians that the entire town is preserved by law as a national museum); the striking contemporary architecture of BRASILIA; and PANAMA CITY with the Panama Canal, Spanish ruins, and free-port shopping. These great points of interest are complemented by an assemblage of South America's truly outstanding hotels. Total cost is \$1599 from New York.\*

### EAST AFRICA

#### 22 DAYS \$1549

**Jan. 26, Jul. 13, Jul. 27, 1969**

A luxury "safari" to the great national parks and game reserves of Uganda, Kenya and Tanzania. These offer a unique combination of magnificent wildlife and breathtaking natural scenery: great herds of elephant in QUEEN ELIZABETH PARK, in the shadow of the fabled "Mountains of the Moon"; a launch trip on the White Nile through hippo and crocodile to the base of the thundering MURCHISON FALLS; multitudes of lion and other plains game in the famous SERENGETI PLAINS and the MASAI-MARA RESERVE; the spectacular concentration of animal life in the NGORONGORO CRATER; tree-climbing lions around the shores of LAKE MANYARA; and the AMBOSELI RESERVE, where all types of big game can be photographed against the towering backdrop of snow-clad Mt. Kilimanjaro. Air travel is used where possible, enabling longer stays within the parks. Also seen are the fascinating capital cities of KAMPALA, NAIROBI and DAR ES SALAAM, the exotic "spice island" of ZANZIBAR, and the historic MOMBASA, a beach resort on the Indian Ocean, with its colorful Arab quarter and great 16th century Portuguese fort. Tour dates have been chosen for dry seasons, when game viewing is at its best. The altitude of most areas provides an unusually stimulating climate, with bright days and crisp evenings (frequently around a campfire). Accommodations range from luxury hotels in modern cities to surprisingly comfortable lodges in the national parks (some equipped even with swimming pools). Total cost from New York is \$1549.\*

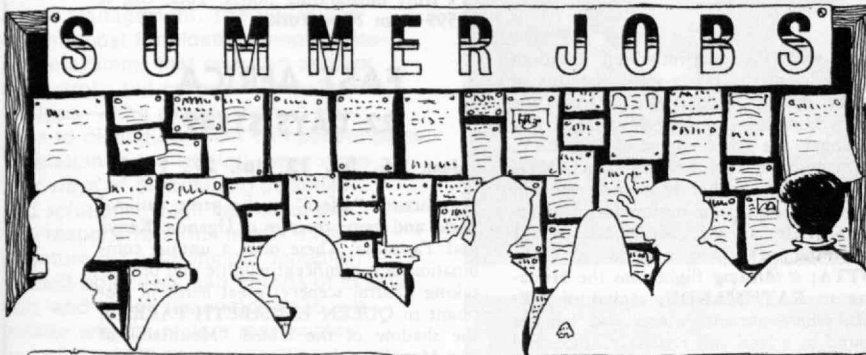
**\*Special rates from other cities on all tours. Tour cost includes Jet Air, Deluxe Hotels, Meals, Sightseeing, Transfers, Tips and Taxes.**

For ALUMNI FLIGHTS ABROAD  
 Full P.O. Box 99  
 Details Lenox Hill Station  
 Contact: New York, N.Y. 10021

Please specify tour and year in which you are interested.



# Kane on M.I.T.



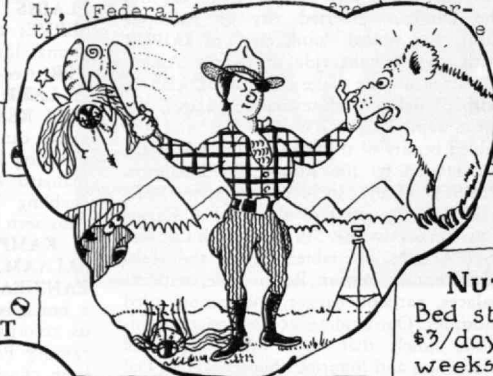
LAST SUMMER a Harvard Freshman cleared over \$4,000 selling Webster's New World Dictionaries door to door. Interested? Will arrange a demonstration. Call at Room 1000. Write to



**WANTED: Cook and Asst**  
Cook. Feed 100. Lake Farm Camp, O. Mass (Cape Cod) or any other place with from 20th.



**WANTED! Highway Engineering Technicians** on seasonal projects in Alaska. Rugged mountainous terrain. Physical fitness essential. \$268 - \$324 Biweekly. (Federal)



**ARCHITECTURE STUDENT**  
to design six classrooms for church



**TANGLEWOOD**  
the summer home of Boston Symphony needs guides. No musical abilities necessary.

**NUTRITION STUDY**  
Bed study ~ Earn \$3/day for 6-8 weeks. Free-choice diet.



**SUMMER OPPORTUNITY**  
Excellent opening for a PIONEERING COUNSELOR  
Information available



**WANTED: Small Crafts Instructor**



**SUMMER IN THE NATION'S CAPITOL JOBS**

learn how a large municipal highway department operates  
earn \$4466 to \$7239



TRAINING DEPARTMENT OF COLUMBIA WASHINGTON, D.C.

H.B. KANE

# Class Review

## 95

We regret to announce the death of **Charles W. Berry** on March 30, 1968, at the age of 95; he was the oldest member of the M.I.T. Faculty. He was born on May 21, 1872, in Charlestown, Mass. Following graduation in 1895, Professor Berry received the Swett Traveling Fellowship for graduate study at Göttingen, Germany, returning to the Institute in 1899 as an Assistant Instructor in the Department of Mechanical Engineering. He became an Assistant Professor in 1908, Associate Professor in 1912 and Professor in 1920 before retiring in 1940.

An authority on refrigeration, Professor Berry was inventor of the temperature-entropy indicator. He was a 50-year member of the American Society of Heating and Refrigeration Engineers and was a consultant to many firms on problems of thermodynamics. He was also a member of the Society for the Promotion of Engineering Education, the American Society of Mechanical Engineers and the National Association of Practical Refrigeration. He was a member of the Mayflower Society of Boston. He wrote many textbooks on thermodynamics and also wrote frequently in papers and magazines—articles on politics, education and science.

Charles Berry is survived by a daughter, Miss Ruth L. Berry of Hingham, Mass; two sons, Richard S. Berry of Hingham, Mass., and Andrew C. Berry, 2d, of Appleton, Wis.; and five grandchildren (Ruth's children). "He certainly had a good and a long life and achieved much," said Ruth. "He has been remembered not only in these last few days but also all through the years by great numbers of his former students—always with gratitude—certainly a fine tribute."—**Andrew D. Fuller**, 1284 Beacon Street, Brookline, Mass. 02146

## 96

Retired Rear Admiral **Ruben E. Bakenhus** died on October 6, 1967. The Navy refused to give the date of death and

location but their letter of refusal referred to the *late* Rear Admiral Ruben E. Bakenhus. Mrs. Bakenhus sent a notice received from the Navy giving October 6, 1967, as the date of death. Your Secretary wrote her a letter expressing the sympathy of the Class. In February, 1958, Bakenhus wrote: "Some time ago my death was reported to the Secretary. When I was in England, with written permission of the Secretary of the Navy, attending a World Engineering Congress a letter from the Navy Department came to my apartment. Someone, I never could find out who, marked it DECEASED and sent it back to the Navy Department." Answering a letter concerning a Class reunion he mentioned the New York Yacht Club, of which he was a Navy life member, as a place to have a meeting. The majority of the Class was too old so there was no reunion. The Admiral did a great deal of fencing with the foil, épée and sabre until his opponents got relatively younger and younger. . . . **Charles Johnson** of 2131 Cherokee Street, Baton Rouge, has not been heard from for a long time. Any news about him would be greatly appreciated.—**James M. Driscoll**, Secretary, 129 Walnut Street, Brookline, Mass.

## 03

It is my pleasure to announce to all classmates the entrance to our Hall of Fame of **Howard Scott Morse**, I, now residing at Indianapolis, Ind. Howard was born June 21, 1881, in the colonial town of Dedham, Mass. The town of Dedham is situated along a picturesque section of the Charles River. Howard, in his boyhood days, once paddled a canoe the entire length of the Charles River from Dedham to the Winthrop shore of Boston Harbor. He attended schools in Dedham through high school then entered M.I.T. with our proud group and graduated in 1903. While attending M.I.T., Scotty took an active interest in college affairs and was Editor of the *Technique* (**J. Tyrell Cheney**, II, Manager, **Paul Parker**, XIII, Assistant Manager and **Andrew Hepburn**, IV, Art Editor). The summer after graduation Howard worked for the Pennsylvania Railroad for \$50 a month. Those

were the days when railroads were at their peak and all work was fascinating. By prior arrangement, he returned to M.I.T. as Assistant in Surveying, Civil Engineering Department.

Howard later entered the service of U. S. Reclamation Bureau under James R. Garfield, Theodore Roosevelt's Secretary of the Interior. He was assigned to the Yellowstone Irrigation Project in eastern Montana where he worked as Resident Engineer from 1904 to 1908. He requested a transfer so he could return to the less out-of-doors type of life, but this was impossible due to the depression. Accordingly, he was given a leave of absence which he is still on, though without remuneration. Next, Howard was a Resident Engineer at Louisville, Ky., in the construction of a sewerage system for the city. It was here he met his wife, Mary Shreve Polk. The Morses were blessed with two children, a son and a daughter, and Howard is now proud grandfather to five grandchildren. When first married, Howard lived in Cincinnati, Ohio, where he was principal City Engineer in charge of sewerage construction. He was next elevated to Director of the Cincinnati Bureau of Municipal Research. He then went to Detroit, Mich., as Engineer of Government Research.

In 1918, he returned to Ohio as Director of Public Service in Akron. In 1825, Howard became General Manager of the Indianapolis Water Company. He directed the development of the two large impounding reservoirs, one of which was named in his honor. During his 32 years supervision with the Water Company, Howard served as Manager, President and Vice President. Recently, he has been interested in civic projects and is President of the County Council. During his term of office he ordered a salary survey to set up an equitable salary plan for county employees. He had been President of the Indianapolis Board of Sanitary Commissioners. Among the state and local groups to which he has given of his engineering and administrative talents are the Advisory Committee of the Indiana Water and Sewerage Development Organization and the Indiana

Post War Utilities Committee, as Chairman of both; the Indiana Flood Control and Water Resources Commission; the Legislature and Advisory Committee of Indiana Engineering Council. Long active in A.S.C.E., a member since 1907, Howard was Director of District Nine from 1935 to 1938. He was instrumental in organizing the Kentucky Section of this organization. He is a former President of the Indiana Section and current Chairman of the Indiana Water Study Committee. In 1952, Howard was made an honorary member of the American Water Works Association and received the George Warren Fuller Award of the organization for "meritorious service in the water works field." Howard retired as Chairman of the Indianapolis Water Company in 1960. His son, Daniel Polk Morse, now holds the position as President of the company. Although Howard has retired, he is still busy working with various organizations in Indianapolis; among them, the Rotary, the American Water Works Association and the American Society of Civil Engineers.—**John J. A. Nolan**, Secretary, 13 Linden Avenue, Somerville, Mass. 02143; **Augustus H. Eustis**, Treasurer, 14626 Canton Avenue, Milton, Mass. 02186



Howard Scott Morse, '03

## 05

**Jim Barnes** has moved from Miami to 52 Chicago Boulevard, Detroit, Mich. 48202. The last time I heard from him he was building launching pads for our biggest rocket ships at Cape Kennedy. I have failed to get the reason but perhaps our only classmate in that region, **Emmet Dwyer**, can find out and drop me a line. . . . Cards from **Bill Ball** and **Peg** tell me they have been enjoying Florida (Sarasota) since November. I can't imagine them staying away from Cape Cod much longer. Perhaps we will see them at our 63d Reunion at Cambridge on Alumni Day, June 10. You will read these notes just in time to make arrangements to be at the luncheon. We are expecting 25 at our table.

We had a bit of a class reunion at the March meeting of the M.I.T. Boston Club at the Union Oyster House, Boston, on March 14. **Hub Kenway**, **Herman Gammons** and I sat at the Founders Table, but I was the only one who could qualify as a Founder. The founding began at Thompson's Spa many years ago, perhaps 30, when Don Goss, '18, Gardner Gould, '07, Ed Delany, '21, Warren Evans, '39, and George Warren Smith, '26, had an M.I.T. table daily until Thompson's Spa fell apart. After that, the monthly meetings were held at the Union Oyster House, where Laurie Greaves and I had quite a problem working out a menu at 95 cents per. Incidentally, Kenway and Gammons attended by taking their lunch hour. Here are two '05ers who are at their desks daily.—**Fred W. Goldthwait**, Secretary, Center Sandwich, N. H. 03227

## 06

In a welcome, interesting, and long letter, Guy Ruggles, Jr., confirms the statement I made about how his Dad got around—by letter and in person. To quote—"In going through his records and files I am amazed at the amount of correspondence which he maintained with friends, associates, societies, etc. I know that Dad had one wish, or desire, fulfilled and that was to attend the 60th Reunion the Class of 1906." Guy, his wife, and their children frequently visited back and forth—east and west—and Guy Junior had spent a week with his dad only a couple months before he died. Guy's folder in my files is much, much, fuller and thicker than any other. Won't you, and you, take over and drop me a line or even a card, now and then? I'll try to answer all of them, so pick up your pen now, you'll find my address at the end of these notes.

**Fay Libbey** had Guy on his mind too and sent me an obituary that he spotted in a miner's journal, *Pay Dirt*, of which **Charley Willis**, III, was founder, and, for a time, the editor. As you may recall, I reported in the January '67 notes the occasion when Guy, as a holder of the Legion of Honor Award, presented that award (of the Institute of Mining, Metallurgical and Petroleum Engineers) to Charley Willis, with a picture of those two miners in the Arizona Republic. Guy's passing leaves a void in lots of places. The latter part of March Marion and I met Anne and **Bob Rose** at the Museum of Science and, after a tour of the first floor, we were Bob's guests at lunch on the top floor, facing the glittering waters of the Basin with the tall dorms rising from the M.I.T. Campus. Will some of you join us on that campus on Alumni Day, June 10?—**E. B. Rowe**, 11 Cushion Road, Wellesley Hills, Mass. 02181

## 07

The letter and accompanying list of Class statistics that I mailed to all the Class members the middle of March has been most rewarding, not only in the response for Class dues, but also in the many interesting notes and letters that have been sent along with generous checks. As I write this early in April, we have \$228 in the Class treasury, and I have heard from 24 of our 77 active members. As you read this in June, it may remind you that the letter you intended to write has not been sent. It is not too late, so do it now and enclose a check if you can. . . . I had a very fine brochure from **Jack Kinneer**, III, from Los Altos, Calif. It is headed, "Fifty Years in Mining" and gives Jack's history and accomplishments, which are many, from his arrival in the United States from Scotland in 1900 to his retirement at Los Altos at the Kinneer Ranchito, Inc., 10 years ago. The booklet is liberally illustrated with photographs. It is a history of another '07 man who has added much to our nation's welfare. It will find a welcome place in the '07 Archives. If any of the Course III men wish to read it, I will send it to them. If all of us could duplicate this fine piece of work, your Secretary would be much relieved from trying to find items of interest to put in the '07 notes.

**Frank S. MacGregor**, VIII, writes: "Last June I attended not only the 60th Reunion of '07 but also the dedication of Ruth MacGregor Hall at Mount Holyoke College, South Hadley, Mass., and thence back to Cambridge to attend the luncheon of the Corporation at the Faculty Club at which time a symbolic ground-breaking ceremony for MacGregor House was held." Not only has Frank given a dormitory in honor of his sister at Mt. Holyoke but he has also given one for men at M.I.T. . . . **Herb Eisenhart**, X, spent this past winter with his wife in Arizona, and has recently returned to Rochester, where most of his family live, although the grandchildren are pretty well scattered over the world. . . . **Otis Fales**, II, is still active in business and goes into his office a few days each week. . . . A letter from Mrs. Parker Dodge (nee Charlotte Phelps, '16) brings word that Parker is no better but suffers no pain and always recognizes her when she visits him about three times each week. He is in a home 26 miles from their house in Brookline, Maine. Some of you fellows who knew Parker could at least send a card that could be read to him. . . . **Roland Willcomb**, III, is retired and lives at Silverdale, Wash. He is comfortably located on a 13 acre tract of woodland, with beach, on Hood Canal, in the Puget Sound area of Washington. The windows of his home look westward over the two-mile-wide waters of the tidal estuary to the snowy peaks of the Olympic Mountains. There are clams and oysters on the beach, and salmon and bottom



fish can be caught just off shore. Roland's interests are largely confined to the children of Nature—animal, vegetable and mineral. He writes: "I have a small studio where I can pursue hobbies and display our trophies. In this studio is a modest lapidary where I enjoy cutting and polishing cabochons to be converted into jewelry from friends and family. There is also a photographic dark room where a lifetime avocation is carried on." The Willcombs had a family of four girls. There are now 10 grandchildren and four great grandchildren. Roland's first wife passed away in 1961, and a year later he married the widow of a former engineering associate; and today they are "happily coasting down the Sunset Skies." . . .

**J. R. Randall, II**, writes to advise us of his new address, 5200 West 68th Street, Prairie Village, Kansas 66208. . . . A letter received late in March from Miss Dorothy B. Keeler contained the news of the death of **Warren I. Keeler, V**, in January, 1967. I wrote her extending the sympathy of the Class, and she graciously sent me an obituary notice from a New London, Conn., paper. Warren was the Founder of the Keeler Paint Works in New London, Conn., in 1944 and operated the business until his retirement in 1953. Previous to this, he had been a Chemist for the Valspar Varnish Company in Brooklyn, N. Y., for 16 years. While living in New London he served as President of the local Y.M.C.A., was a member of the Second Congregational Church and a Rotarian. He is survived by his widow, two sons, a sister, nine grandchildren and one great grandchild. . . . In an earlier set of notes, I told you that **Jim Gaylord, VI**, and **Kirk Dyer, X**, were graduated from Caltech in California and were to attend their 65th Reunion at the same time we were having our 60th. Kirk has recently written to me noting Jim Gaylord's death on February 23, 1968. He went to his 65th Reunion; but evidently Jim was unable to go, and Kirk called to see him three times while at the Reunion. I have written to Jim's daughter, Mrs. Roswell Roberts, to express the sympathy of the Class. Jim was Chief Electrical Engineer for the Metropolitan Water District of Pasadena from 1932 to 1950. Following this, he held the position of Manager of Hydro-Generation for Southern California Edison Company for nine years. He was a fellow in A.I.E.E., a member of the Gnome Club, and a member of Tau Beta Pi, an honorary engineering fraternity. He is survived by one son, a daughter and four grandchildren. . . . I have still another '07 death to record, that of **Edward H. Wing, II**, on March 17, 1968. His father, Charles F. Wing, had founded a successful furniture business in New Bedford in 1874. Edward gave his life to this business besides being very active in civic affairs. He was the first President of the New Bedford Retail Furniture Dealers Association; he served as a Director of the Merchants National Bank and was a former Trustee of the Five Cent

Savings Bank. He held membership in the Wamsutta Club and the Old Dartmouth Historical Society. Surviving are his widow, two sons, and two grandchildren.

Mrs. Albert P. Mansfield wrote me a very interesting note which told of some of the misfortunes that Albert had gone through. In February of 1967, he had a cataract removed from his left eye. After six weeks, he was fitted with cataract glasses, but they did very little to help his eyesight. In June he was coming down stairs, slipped on the bottom stair and broke his ankle in three places. This meant two operations. During the second one, three screws were used in the ankle and then a plaster cast. Before he recovered he had a detached retina in the same eye and had to go to the Eye and Ear Infirmary in Boston. Two more operations, and he was completely blind in this eye and now has a rapidly growing cataract in the other eye. This means he is almost completely blind. Mrs. Mansfield closes by saying: "Otherwise, at 83 years old, we are doing very well." They have four children, 13 grandchildren and two great grandchildren. I am sure Albert would appreciate cards or letters from some of the men who knew him at Tech. . . . **Jim Garratt, I**, is always one of my loyal supporters in both giving and in writing. He has answered every letter for help that I have sent out. He still is active, trying to obtain additional water supplies for the City Newark, N.J., and its surrounding municipal customers. The last major improvement, the Wanague Reservoir, was built in 1930; and Jim has been trying for 38 years since to get improved supplies and service against all kinds of "obstructionists." A number of piece-meal projects have been added, but he notes that the cooperation of everyone is needed; and this, they cannot get. Evidently politics has to be contended with. He hopes to live long enough to see the situation righted.—**Philip B. Walker**, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass.; **Gardner S. Gould**, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

## 08

Remember, our 60th Reunion will be held June 7-9, 1968, at the Melrose Inn, Harwichport, Mass., on the Cape. Plan to be with us and see the old crowd—ladies are invited too. Headquarters will be the Beach House as usual.—**H. Leston Carter**, Secretary, 14 Roslyn Road, Waban, Mass. 02168; **Joseph W. Wattles**, Treasurer, 26 Bullard Road, Weston, Mass 02193

## 09

We received the following note from our Assistant Secretary **George Wallis**: "We were unable to make our usual trip to Florida and spend the winter at

Pompano Beach. Marcia had an upset last summer and, after some time at the Massachusetts General Hospital, she has been confined with a nurse at Wenham. I am glad to advise that she is showing slow but steady improvement. From telephone conversations with some of our Florida friends, I should judge the weather down there has been on the chilly side. Good golfing conditions, however." We are sorry that George and Marcia could not go to Florida this winter. We all hope that Marcia will continue to improve and soon regain her usual health. . . . In the February Review we stated that Art and the Secretary had discussed with Fred Lehmann's office the possibility of our Class holding its 60th Reunion on the M.I.T. campus. We were advised that we would be welcome to a dormitory and other arrangements such as a meeting room, and opportunities for dinners and gatherings would be available to us. Art has written us from Florida stating that we should get the wheels turning in the direction of the Reunion. He suggests that the subject be discussed during luncheon on Alumni Day, June 10, and that formal action be taken immediately thereafter. (It will be recalled that we followed these proceedings on Alumni Day in 1967 when we elected the present Class Officers.) Hence, we are urgently requesting a large attendance at the luncheon.

Art writes further as follows: "We have had a restful winter here on Longboat Key. Not quite as placid as usual because of one death and one serious illness among our group of friends. I had hoped to attend the Alumni Association affair in Orlando in January but failed to work it in. We do intend to go on the picnic of the M.I.T. Club of Southwestern Florida in Englewood next Sunday, March 31. This is held on the estate of Bill Grunwell, '28, which extends from the Gulf to Lemon Bay, permitting the selection of a sheltered spot whatever the weather (barring rain). We plan to start for home about May first, and, with a couple of short stopovers with relatives, should be back in Auburndale in about a week or ten days."—**Chester L. Dawes**, Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; **George E. Wallis**, Assistant Secretary, 185 Main Street, Wenham, Mass. 01984

## 10

**Max C. Sherman** writes: "After a varied previous career have operated a successful small vending business, but am soon to retire from same. Five children, 11 grandchildren, and 12 great grandchildren." . . . Word has been received from Essex Falls, N.J., of the death of **M. F. Tiernan** as follows: "Martin F. Tiernan, 85, a pioneer in the chlorination process of purifying water and a leading industrialist, is dead. Mr. Tiernan was former President and Chairman of Wallace and Tiernan, Inc., Belleville. He and

Charles F. Wallace, Westfield, founded the firm in 1913. The plant, which manufactured water purification equipment, moved to Belleville in 1921 and has expanded to include chemical, pharmaceutical and equipment divisions in this country and abroad. Both men received medals from the Franklin Institute of Philadelphia for their contributions to the welfare of mankind through their improvements in the chlorination process in water purification in 1922. Mr. Tiernan was President and Chairman of the Belleville Company until 1954, when he retired while remaining on the Board of Directors. He retired from the Board in 1964 along with Wallace. Mr. Tiernan is survived by three sons, two daughters, a sister and 24 grandchildren. His wife, the former Miss Purcell Carroll, Brewster, N. Y., died in 1958."

**Allen Gould** writes: "The March *Technology Review* just arrived wherein you report a score of 80 replies out of 167 sent out to classmates. Not a too bad final report and undoubtedly some of the 80 not only returned their card to you but were inspired to write direct to old boys whom they had lost track of during the years. This was true in my case when I saw **Harold Lockett's** message to you. I dug up current address and wrote him. Except for a brief contact with him in the A.E.E. in 1918, when I was landing at Brest and he was coming out or vice versa, I had not seen him since the days of the 1910 Relay Team—and graduation. Had a good newsy reply and caught up a little on his doings of the last several decades. He didn't mention how fast he runs the 220 these days but sounded as though he gets around and does some traveling. I got a great kick out of the exchange of letters with him and look forward to more. So you, Herb, can take credit for that with your postcard system, and undoubtedly you spurred others of the 80 classmates to similar activity. We all thank you and even though the returns were low percentage wise, they were much appreciated. Maybe you will try it again!"

**Chester W. Wilson** writes: "We started last April planning for a rather complicated camping trip in which eight of the family and a young student of my daughter were involved. The older grandson took a flight with a stopover in Greenland to London. The middle grandson took the *Queen* to England and took the big camping bus on his ticket, thus saving about half the freight costs, my wife, daughter and husband and younger grandson took a plane, B.O.A.C. to London, where they picked up the bus and drove to the continent via the ferry and were to meet the other boys in Switzerland. They had set a time and date at which all of them and two other students would meet! The two older boys when they met had continued on via youth hostels but everyone arrived at the rendezvous practically on time from dif-

ferent directions! The older boy looked at his watch and said, 'You are 5 minutes late!' They then all toured through central Europe and met me in Mestre, Italy, as I arrived via Alitalia plane on August 4. In order not to make this too long, we all went on, after seeing Venice, to Zagreb thence to Athens, Greece. The plane seats had been reserved since April! We had to stow a car in town and get our luggage back to the airport for the plane and left a two hour leeway so there would be no question of being on time. However, here was our first sample of Communist utter disregard for agreements! We were told that the plane was full! When we protested and showed our written reservations we were told 'local traffic first!' They said there was another plane in 10 minutes, knowing full well we could not make the changeover and go to town and back in 10 minutes! 'Maybe tomorrow,' they said! So we said to heck with it and got out of their country as fast as we could. Later, on our return, we told the local agencies about it and they said that they had other complaints yet at the joint conference of travel agencies the Communists swore that they never did such things in spite of the mass of evidence to the contrary here."

"At this point we divided and some took the train to Vienna and the rest to West Germany. The group going to Vienna wanted to cross into Slovakia and take the train to the capital and come back down the Danube by hydroplanes to see their beautiful country along the publicized river. They were told they could come back by train just as well but our group said they would prefer the scenic ride. So they said the boat was full and if we did not want to travel the way they said why didn't we stay in our own country? So all papers were cancelled and an effort to get our money refunded was made but they said they could not let that much money go out of the country! No trouble in its coming in though! So then we had to say we would stay out of their country gladly and withdrew altogether! We all met again in Munich and stayed together from then on pretty much. We went into West Berlin and enjoyed it very much and stayed there several days, during this time we went over to East Berlin for the day. This was interesting in a sad sort of way. If you want to park you go there as there are acres of parking lots and three or four cars in them; lots of war damage still apparent, they are gradually rebuilding but still have a lot to do. It was depressing to see soldiers in pairs on the streets on patrol duty with carbines over their shoulders which brought home the fact you were in a police state. No other place did we see any such thing. From there we split again all going to Holland and Denmark and spending a week in Copenhagen. From there some went to Sweden for a couple of days and we went to Norway for two days, making a day trip up Stavanger Fjord during a day of mixed weather, rain a.m. and

clear p.m. While in Copenhagen we spent several hours a day in Tivoli and I got a lot of night color slides of the extravaganza."

"Our next travel was south through Germany to Luxembourg and I took a lot of slides in the valley which is beautifully lighted by night. We started home from there and I did not realize the ground we had covered until my son-in-law said, 'I do not think many men your age have been in four countries on their birthday!' Then I noted that we had left Luxembourg at 9:00 a.m. and gone through France, Belgium and across the channel to England where we camped for the night in Dover! The next few days we spent seeing England again and then home via B.O.A.C. and Montreal's Expo 67! Spent three days there and then flew home to Boston by Northeast Airlines. One very enjoyable part of the trip was our stay in Berchtesgaden where we did not camp but stayed at the old Wittelsback Hotel and from there took day trips to the scenic Bavarian Alps around us, including also the Salt Mines at Salsberg and the old castle where the *Sound of Music* was filmed. We were told that the town fathers of Berchtesgaden blew up the ruins of Hitler's retreat in the mountains as they did not enjoy the negative publicity. It was a memorable trip and one we will never have again."—**Herbert S. Cleverdon**, Secretary, 120 Tremont Street, Boston, Mass.

## 11

From **Frank G. Smith** of Honolulu: "Enjoy reading the *Review* although some articles are beyond my comprehension. I do notice that all class notes are filled with the 'doings' of ourselves, so I will write a sort of autobiography. My life has been full of anomalies. Born February 28, 1885, I graduated from Barrington, Conn., High School in 1903 and went to work in the local brass mill in September. While I started in washing dishes in the lab, in a year or so I was taking photomicrographs of brass, and in that time had read *Gorres—Metallurgy of Iron & Steel* from cover to cover. I decided to go to college in 1907 and because my boss was a Tech man, I favored M.I.T. But I had no money for college, had been out of school working for four years and was at a loss. I went back to high school to study history so I could (maybe) pass exams. Later I got word from the Dean that considering my experience, I'd be allowed to enter without exams on my own responsibility to make the grade—this after recommendation from school principal and my boss, a fine man. So I got to Tech and except for calculus, at first, it was the time of my life—only five or six hours of class a day after being used to 59 hours a week for \$9 to \$12. I made out all right and the Mill Superintendent, who discouraged my going at all, loaned me the cash for the second year.



After that the Treasurer of the company supplied cash whenever I asked for it. Then when it came time for M.I.T. graduation, I was in the hospital and got my diploma without taking any final examinations."

"I went back to the brass mill and stayed there until 1965. I traveled over the U.S. as Representative at various conventions—a member A.S.T.M. and A.S.M. and M.E. and American Water Works Association. I served many years the nonferrous subcommittee of A.S.M.E. and though I was never a member of A.S.M.E. or even of the committee I received, in 1963, a certificate of appreciation for the 13 years I had served that important committee. Now after about 11 years retirement I am really about done. Mrs. Smith and I get along nicely with a 'yard man' and a 'housekeeper' once a week. I could never keep ahead of the fast growing vegetation nor Mrs. Smith keep ahead of the cleaning and ironing without such help. Neither of us is vigorously well—coronaries, arthritis, and all but we keep going. When I feel a bit hemmed in on the 825 square miles island of Oahu (because I can't drive a car now and Mrs. Smith can just get away with it) I make silk screen prints for correspondence and seasonal cards. Once Professor 'Blackie' Blackstein (French class) caught me drawing a cartoon of him on the blackboard. I made his heavy eyebrows and unruly hair look like the devil. 'Ah hah Mizzer Smiz, zee artiste, what course you take?' I said 'Mining, Metallurgy.' He replied, 'No, zee artiste should not be in the groun' but up top in zee sunlight.' Well, I'm finally up top in the sunlight most of the time, though this winter has been cool and rainy. I guess I should have been an artist of some sort. I always loved sailing yachts, never owned one, but in 1939 I did build an A Class model yacht and brought it many times from Waterbury, Conn., to Boston to race at the Model Yacht Club near Massachusetts Avenue at Storrow Lagoon. I really would have liked to become a sailing yacht designer. Nat Herreshoff was an idol when I was young and I met him and visited with him many times after he was 80-85 and lived in Newport, R.I. He showed me his work shop on fourth floor with all the models and machine tools and hand tools. They all looked new, as if they had never been used. He sailed in his small boat in Florida when he was 80, then had to give this up, so he made models and that is how I became interested in them in 1927 and later in 1937. I have my A Class model here in Hawaii but there is no place here in the middle of the Pacific Ocean to sail it. I hope to give it to some teenager who is interested in sailing—at a model yacht club on the mainland. I guess this is enough about the past and present doings of an old timer." Frank asked me to edit and possibly rewrite some of it, but I think it is good enough to put in as he wrote it. It appears that I made a blunder in the March

notes. His granddaughter, who was married at Christmas time two years ago, has a son which makes Frank a great grandfather. Her husband, who had been flying a jet fighter in Viet Nam, was in Hawaii in March for rest and relaxation where his family joined him.

The following came from **Marshall Comstock** with his contribution to the Alumni Fund. "Wife and I are well at over 80 years of age, and are spending the first three months of 1968 at Clearwater Beach, Fla. We now have three children, nine grandchildren and one great grandson." . . . I have two new addresses: **Edward C. Vose**, 221 Winslow, Waban, Mass. 02168; and **Irving W. Wilson**, 1201 Murrayhill Avenue, Pittsburgh, Pa. 15217. . . . Indirectly I heard of the death of **Harry Alexander** in Meadville, Pa. Harry had an A.B. degree from Washington and Jefferson College when he came with us. He had the drawing table next to mine in the mechanical engineering drawing room during our senior year, but I have lost track of him since then. If my memory serves me, he went to work for the Goodyear Rubber Company direct from Tech. . . . **Leroy Fitzherbert** has returned from a winter in Palma de Mallorca where he found three other Tech men enjoying the good climate and leisurely life. The Englishmen staying at his hotel were unsympathetic to U.S. involvement in Viet Nam. They think we never should have been there in the first place and now should forget our pride and get out.—**Oberlin S. Clark**, Secretary, 50 Leonard Road, North Weymouth, Mass. 02191

## 12

**Do you remember** our freshman German professor, Blackie, a short, stocky man of Prussian type with cropped, black hair brushed back like the modern crew-cut? I recall that with a good knowledge of German, I tried three times to pass the relatively easy advanced German exam before admission. I flunked it every time, so had to take the course. Afterwards I learned that only those of German ancestry passed. No wonder—the course was one for German propaganda. Everyone in the class who listened to Blackie's tales of German superiority without comment was passed, or was it because the class presented him at Christmas with a small keg of beer marked, '*Lang lebe Herr Meister?*'

I have a note from **John Pettingell** whose history since graduation was published a year ago in the *Review*. John lost his wife in 1962 and was again married in 1964. He is in good health and enjoying retirement, having traveled to Florida or to the Caribbean winters for the past 15 years. He attended the M.I.T. Fiesta in Mexico City last year and says he would recommend it to any classmate. He had an enjoyable visit with **Dave Guy** and family last summer at their delightful summer home

in the Maine woods. John has an interesting hobby, genealogy and history. He is a member of several historical societies and expects to publish his second book on this subject very shortly. This winter he is vacationing in Clearwater, Fla., and we hope to visit him on our way home. . . . After some persuasion I have received the following contribution from **Jim Cook**, our good friend and dedicated classmate. Our two families enjoyed several summers together at Echo Lake, Southwest Harbor, Maine, where we hiked, fished and sailed. Jim's ready wit often smoothed out the trail when the going got rough. Jim writes: "Back in 1912, and before graduation, there was a surprising failure of industry to recognize talent and genius when signing up M.I.T. graduates of that year. It was late in May before General Electric picked **Norman Hall** and me for a one year apprentice course at Sprague Works in Bloomfield, N.J. We both completed the course. Norman soon left and set up his own successful electric hoist business. The next year I joined the Cleveland Construction Company and became engaged in office and field engineering in Cleveland, Hudson and Cincinnati. Then World War I brought our work to a stop and jobs became scarcer than hen's teeth. After traveling the Atlantic coast and becoming nearly destitute, I decided to go to Chicago. If I were to starve, no one would know me there and I would not become a public nuisance. I lived at the Y.M.C.A. where I dined with **Jay Pratt**, a fellow resident, who at that time was busily courting the lovely Priscilla, now his wife and a loyal friend of our Class. At long last, I was offered a three week job by William B. Jackson of the engineering firm later known as Jackson and Moreland. I gladly accepted and the job lasted 3½ years to our mutual satisfaction. Field engineering studies took me to the mid-western states and along the Atlantic coast."

"In June, 1916, a telegram from Uncle Sam reached me at La Crosse, Wis., suggesting that I be in Chicago the next day or dire things would happen. So I reported, and went with Company A, Illinois Engineers, to San Antonio where I remained for over four months. This assignment was due to trouble in Mexico but we saw no warlike action. Our quartermaster sergeant was **D. A. Tomlinson**. This southern trip caused postponement of my wedding to Hildur which finally took place in Chicago in November, 1916. On that cold morning I arrived from Texas, clad in a thin Army uniform, and met Hildur who detrained from Boston at 11 a.m. As it was Saturday, we had only one hour to get a marriage licence, but we made it and all was well. In 1917 I went to New York for work with what is now the Consolidated Edison Company. I soon became Assistant Superintendent, Test Department, and later Assistant Superintendent, Distribution and Installation Department. The work was intensive, interesting and



rewarding. In 1925 I transferred to Lynn Gas and Electric Company where I served successively as General Superintendent, General Manager, Executive Vice President, President and Chairman. I retired from active service in 1958. Our family included two daughters, Mary and Sue, and one son, Jim Jr., all of whom are now married. In 1964 a violent fall on the asphalt broke my right hip and a year later, while crossing a street in Marblehead, I was struck by an auto and received serious injuries. After three months in the hospital, my right leg is an inch shorter than the left. Prior to the second accident, Hildur died after a long illness. I now live in a small apartment in Marblehead, Mass. I no longer drive but walk one to three miles each day in this scenic and historic seashore town. My address is 59 Prospect Street, and the phone number is 631-0850. Give me a call if you visit Marblehead and we shall chat and break bread together in the nearby Atlantic Restaurant. As many know, Hildur and I attended most of the reunions. I look forward to the coming Alumni Day and the gathering of the Class of 1912."

**Hugo Hanson** tells me that he moved to Myrtle Beach, S.C., in April, 1965, following his retirement in January of that year. He finds the community mostly hospitable and likes the warm climate. The first year after graduation he spent in an industrial chemical laboratory following which he accepted a position with the Brown Company at their La Tuque plant, the second sulphate pulpmill on this continent to use this Swedish process. Apparently he was not impressed by the extremely cold winter in La Tuque as the following year found him at Tech as Associate Professor of Chemical Engineering instructing fifth year students, a course discontinued when the war started. After a few months in Washington working on smoke and gases, he obtained a commission as Captain in Chemical Service and pushed off to France to learn how they made mustard gas. With this knowledge he returned home and spent the rest of the war supervising the manufacture of this gas at Edgewood Arsenal in Maryland. In 1918 he moved to Bangor, Maine, where he worked for the Eastern Corporation at their Sulphite Pulp and Paper Plant. Here he remained for 10 years until he left to become General Manager of the Hamilton Paper Company in Miquon, Pa., near Philadelphia. Hugo became President of this organization in 1935 and advanced to Chairman of the Board in 1953, a position he held till 1961. In 1961 Hamilton merged with Weyerhaeuser Company but he continued with the organization until 1965. In 1917 he married Edith Stetson Plummer and has one daughter and two sons, all of whom are married. There are 10 grandsons and one granddaughter. Hugo tells me that despite a heart attack some six years ago, he is now feeling in reasonably good shape and that he and Edith are enjoying their new home in the South.

It was nice to hear from **Larry Cummings** who says he has not yet had any replies to his invitation to visit at his home in Connersville, Ind. The golf season is now in full swing and he will welcome the opportunity for a match with anyone who is still able to hold a club. If that is too strenuous, I am sure he can arrange for a fishing trip. Larry started his career in New York City with the A.T. and T. at \$65 a month, but soon took a job with Miller, Franklin, Basset and Company, industrial engineers and accountants, which entailed much travel throughout the Northeast. During World War I, this job kept him busy at many war facilities including manufacturers of powder tubes, parts for military trucks and ships, shrapnel, gun carriages and communication equipment, as well as plant study for the production of amphibious planes. After the smoke cleared he was persuaded to go into business with an old buddy in Detroit where they were business consultants. After two years his partner was tempted by another job and Larry accepted a position as Works Manager in charge of the Muskegon Plant of Continental Motors, which at that time employed over 6000 persons. He found this a most interesting and challenging job which also gave him a chance to get off the road after some eight years of constant travel. In 1925 he accepted an offer with Metal Forming Corporation as Secretary and Works Manager. The following year he left to take charge of the Connersville Plant of McQuay Norris where he continued for the remainder of his career, advancing to become Vice President and then Director of the organization. We quote: "This was a very pleasant association and there were many interesting angles, one of which was our production of cores and fuses for World War II. We obtained a contract from the Ordnance Department for the construction of a plant to produce 30 and 50 calibre armor-piercing cores. I was given the job of overall planning, plant layout, procurement of equipment and facilities as well as the operation of the plant. We had over 350 automatic screw machines in one room with machines fed by monorail. Chips were removed by under-floor conveyors directly to centrifuges and thence into freight cars, an arrangement which necessitated 86-foot bays. The cores also required heat treating and grinding. Soon additional facilities were necessary and we were operating something over 700 six-spindle automatics, actually producing cores by the billion. We were also one of the larger producers of the V.T. (proximity fuse). I retired from McQuay Norris in December, 1954, but continued as Director until 1965." Les was married in 1915 and had two children, a daughter and a son. There are five grand children, the eldest of whom graduated from Hanover last spring and is already married. Larry lost his first wife in 1964 and has since remarried. His civic and various community interests both in Muskegon and Connersville have been

many. After some 45 years in local and national Boy Scout activities he became the recipient of the Silver Beaver, an honor awarded to but few. In Muskegon he belonged to the Chamber of Commerce, Kiwanis and Century Clubs among others; and in Connersville has served as Y.M.C.A. Director, chairman of several Chamber of Commerce committees, member of Citizens' Improvement Committee, Zoning Appeals Board, Rotary and Country Club, not to mention an engineering committee to study a new sewer system, and others to obtain funds for improvements in the local hospital. He is also an active member of the First Presbyterian Church. Such a record makes many of us feel we have long been sleeping at the switch.

**Wallace Murray** advises that he moved last April to his old home at 11 Laurel Lane, Dedham, Mass. 02026, which had been occupied by his son, Wallace S. Murray, '42. Wallie is still active as Consultant at Arthur D. Little, Inc., Cambridge, Mass., and plans to work on a half time basis in the future. We had a nice chat with him at the Reunion last year, following which he enjoyed a most interesting trip with his son and family to see Colorado, Utah, Nevada, the West Coast, and British Columbia and Alberta. . . . We plan soon to return from our three months sojourn in Florida this winter and hope to see many of you at our Class dinner in Cambridge this month.—**Ray Wilson**, Secretary, 304 Park Avenue, Swarthmore, Pa. 19081; **Jay Pratt**, Assistant Secretary, 937 Fair Oaks Avenue, Oak Park, Ill. 60302

## 13

Last call for the 55th Reunion of the Class of 1913, Massachusetts Institute of Technology, June 7, Friday; Saturday, June 8; Sunday, June 9, 1968, at the New Coonamessett Inn, Jones Road and Gifford Street, Falmouth, Mass. 02541 (on Route 28). Have you sent in your reservation card and your registration check \$5.00 per person, for yourself and each guest? From the latest poll, we expect a goodly group of 60 persons will enjoy this coming Reunion which includes you and your guests. We have lately been notified by the Alumni Office that several of our former classmates have died over the last two years. . . . **Frederick W. Blackwood**, 96 Governors Road, Milton, Mass. 02186, passed away on January 22, 1967. **George H. Sickels**, RFD 4 Portland, Maine 04105, died on February 22, 1968. **Roy A. Randall**, Peaks Island, Maine 04108, departed March 7, 1968. The Class of 1913 extends to their families its sincere sympathy. If any of you have any detailed news of our dear departed friends, your Scribe would gladly include these facts in future Class notes. . . . We have received a very heart-rending letter from Marguerite Kelly. Prescott has had another serious attack but is slowly

recuperating. Marguerite states that they had expected to attend the 55th but due to Prescott's latest illness, it will be impossible for them to travel any long distances. We quote in part: "We had both looked forward to being with you on Cape Cod and being with this fine group of people whom we enjoyed tremendously in 1963—the wonderful Class of 1913. We send warm and affectionate wishes for a most successful Reunion in June."

Received a very cordial note from **Fred Lane**. It is very pleasant to learn that Fred and his nice wife will be in Falmouth, June 7, for dinner. Further information will precede these notes regarding the Reunion. . . . It is always a pleasure to hear from **H. G. Shaw** and particularly to know that Leila and Herb will be with us at the 55th. We shall follow Herb's instructions regarding his reservations. Yes, failing eye-sight is very difficult to bear but after better than two weeks trip by auto to Florida (P.R.C. did most of the 3,400 mile driving) we are back again to almost regular routine. Sorry to hear of Leila's accident and we are overjoyed that she is recovering and will be with us in June 7-10. . . . With all due respect to our late classmate and friend **Lester Gustin**, the "Geographic Register" was compiled by your Secretary and paid for out of the Class Treasury. . . . The Alumni Office will be requested to supply an ammended list as well as a current list of the names of those classmates who have passed away since 1963. . . . The Capens enjoyed the Florida tour and visit. The weather was sub-normal but we both obtained plenty of rest and tan. We phoned **George Bakeman** and his wife but due to conflicting plans of both couples we were unable to visit the Blakemans. A very enjoyable evening and night were spent with Maurine and **Allen Brewer** at Jensen Beach or (in the garden of) Eden, Fla. . . . **William Mattson** was back in Boston for a few days in March and April. Bill came East to honor one of his brothers an Alderman of Newton, who had served for 25 years. **Charles Thompson** had lunch with Bill on March 30 and the Capers enjoyed having lunch with him on April 2. It is always wonderful to see Bill and sincerely hope he and Joe will be with us in June. . . . Well, boys and girls, we shall look for you at Coonamessett, June 7.—**George Philip Capen**, Secretary and Treasurer, 60 Everett Street, Canton, Mass. 02021

## 14

**Te-Ping Hsi** died on March 16, 1968, at his home in New Jersey. Most of his active life, however, was spent in China. He served the Chinese Nationalist Government as Superintendent of Customs, Hankow, 1929-39; and as Director of Central Mint, 1937-44. During the war with Japan, he was concurrently General Manager of Foo Shing Corporations and Foo Hua Corpora-

tion, both government organizations controlling all the procurement and sale of strategic materials. Following his retirement from government service after the war, he was Managing Director of Szechnan Animal Products Corporation, the largest supplier of hog bristles and animal hides in the Far East. His wife Pauline, whom many of us have met, survives him. There is a son and five daughters. . . . A few up-to-date addresses have just come: **Arthur W. Johnson**, P.O. Box 462, Wolfboro, N.H. 03894; and **Henry R. Aldrich**, Maple Shade Road, Middletown, Conn. 06457. . . . **Hugh Chatfield** serves as an effective news source from contacts made on his winter trip to Florida. In March he called on **Art Mudge** who "was in good health and spirits, living in an attractive house on the edge of an orange grove." He plans to be at our 55th. He also saw Gladys and **Charlie Fiske** and lunched at their charming and interesting home. They live near a beach and have a cabana there. They also plan to be at the Reunion in 1969 but not at Alumni Day in 1968.

In answering the reunion questionnaire there is a note from **Leigh S. Hall** from Concord, N.H.: "Am taking it easy these days with winters at Sarasota (Longboat Key) and summers at our camp on Lake Winnepesaukee (Melvin Village). We now have a grandson, Leigh, 2d (son of Sidney L. Hall, '43, and also a grandson of Joe Barker, '16, as his daughter Betty is Sid's wife), now a graduate student, Course XVI, Aeronautics and Astronautics, at M.I.T. Leigh, 2d, is also the nephew of Leigh, Jr., who was the '14 "class baby" and lost his life as a Test Pilot in World War II. Maybe all of the above is something of a record for our class of 1914!" L.S.H. . . . Here's a note from **Ernest W. Mann** who lives in Duxbury, Mass: "My wife, Marjorie L. Mann is now recovering from two major operations and six weeks in a hospital and is at home improving slowly. I gave up my hobby, raising orchids, in September. It was getting to be work and not play." E.W.M. Best wishes for Marjorie and please don't give up all work, Ernie. . . . And a word from **Alden Waitt** to Ham: "Best wishes to you and Alma. Hope your namesake will speed through the waters to many records, victories and championships. Was delighted to read of the gracious honor paid you and am sure the varsity shell dedicated in your name will be a winner. The only news here is the opening, in three weeks, of the first Worlds Fair ever held in the southern U.S., 'Hemisphere '68.' It promises to be worthy of the great state of Texas. I've already incorporated a distant view of the 'Tower of America' in my most recent landscape. It was there in the distance across the field of winter wheat on the ranch where I was painting so I had to include it. Am working diligently to complete three or four new landscapes before my exhibit opens at Men of Art Guild Galleries here next May. Hope we can

get to Germany this summer but it depends on regulation, taxes and the fates. Tom is in Germany now and Betty leaves for Heidelberg in June so we are anxious to enjoy a visit with them."

A clipping from the *Sweet Briar Newsletter* passed on to us by the Alumni Office reads as follows: "The Jarvis portrait of a woman called Gabrielle was given by **Clarence B. Rogers**, M.I.T.'14, of Atlanta in memory of his wife, Mary Clark Rogers, a member of the Class of 1913." In Clarence's note to us he writes: "Retired 1961, from Sales and Engineering Representative for several manufacturers of electrical heating equipment after 30 years service in the Southeast operating out of Atlanta, Ga. Mrs. Rogers, formerly Mary Clark of Hopkinville, Ky., passed on June 30th, 1966. I remained alone in residence until December, 1966, when opportunity made it possible to move into a retirement home, Canterbury Court, sponsored by two local Episcopal churches but open to all denominations, so for a year have had the association of some 120 lonesome elderly people who have gone thru the loss of their mates. I am now engaged to one of the charming widows. Other than the loss of sight of one eye, I am in pretty good shape for one so advanced in years." . . . **I. H. Lovett** writes: "I would very much like to attend the 55th Reunion but the trip back seems like too much of an undertaking. After serving for 40 years at University of Missouri at Rolla I am retired but still have an office on the campus and attend numerous meetings. I also serve as Secretary of the Missouri Society of Professional Engineers, Rolla Chapter.

**Ormonde C. Clisham** notes briefly on a card: "Have been retired since August 5. P.S. It was not my idea." But then he adds a couple of dozen well chosen words: "Retired from Gas Service, Inc., Nashua, N.H., last August and am I having a ball! You see, for years I have been completely obsessed with landscape painting, but was limited to weekends and vacations for indulging that lovely vice. But now, to quote Gauguin, "At last I can paint every day." If that sounds nutty, just call me fruitcake, man. (**Alden Waitt** will understand.) I have a friend who has built a small house in a country town just outside of Nashua and he generously allows me to use his cellar for a studio. So that's where I head for every morning, after breakfast and paint my brains out, working from sketches and partly finished painting which were started in spring, summer and fall. Evenings I devote to records, reading, 'riting and 'rithmetic. By the last I mean occasional tilts at modern math, just to postpone becoming an O.F. (trans.—Old Foggy, or you name it). I see that **Elmer Ellsworth Dawson** (Skip to you) is still percolating in Pittsfield. I went through high school and M.I.T. with that bird and if he is listening let him take heed that



I am plotting one of those 'Do you remember when?' letters. If he is as healthy now as he was then he'll live to be 104. Ho! Hum!". . . **Fred Karns**, whose address is 1242 Elk Street, Franklin, Pa. 16323, says: "I am retired and my time is occupied with volunteer work for my church and for civic committees. My spare time is devoted to my hobbies of photography and oil-painting." . . . **Henry Aldrich** says: "What are we doing? Beachcombing in the sunshine of Naples-on-the-Gulf, Fla., and reading in areas untouched during professional life. Still on call as Map Editor for the Connecticut Geological Survey. Usually choring around, grooming and maintaining a short acre homestead behind a two-rail split fence in the Nutmeg State."—**Herman A. Affel**, Secretary, Rome, Maine; Post Office: RFD 2, Oakland, Maine 04963

## 15

*The editors wish to apologize for an error, the misspelling of the name Donald O. Hooper in the report of his death, Technology Review, April, 1968.*

The Class Supreme. Be sure to come to our annual Class Cocktail Party at the M.I.T. Faculty Club, 50 Memorial Drive, Cambridge, at 4 o'clock on the afternoon of Alumni Day, June 10. This will be followed by dinner in an adjoining dining room. Then we finish the evening with cordials in **Bill Smith's** "Cloud Nineteen" apartment. Your family and guests are welcome. It will be a pleasure to see you all there again. . . . Catherine and **Max Woythaler** spent March in Mexico and wrote: "We took in the wonderful M.I.T. Fiesta in Mexico City and then went by car to Morelia, Guadalajara, Puerto Vallarta and on to Mexico City and Dallas." That sounds like a gay trip for them. . . . Marjory and **Whit Brown** were more "snow birds" hit by Florida's poor weather this winter. About the middle of March Whit wrote from Bradenton: "At least we are getting some good weather here. It began last Sunday with the Red Sox beating the Cardinals here 3-2, a real thriller." . . . At the monthly meetings of the downtown Boston M.I.T. Club, our Class is regularly represented by **Clive Lacy**, **Archie Morrison**, **Wally Pike**, **The Pirate**, **Bill Smith** and me. From contemporary classes with us we see **Charlie Thompson**, '13, **Lester Hamilton**, '14, and **Dave Patten**, '16. . . . **Larry Quirk** appreciated our expression of sympathy for the loss of his wife and wrote: "I have not missed our annual dinner in New York in 14 years but must take a rain check this time. One of my sons, the single one, and I are going to be in Hawaii from April 18 to May 3—the only dates available for our schedules. However, next year will come all too soon for us senior citizens and if I'm still around, you can count me in." . . . We'll be glad to see Larry any time. . . . I call your attention to the 1918 notes this month and will be happy to re-

ceive any expression of your ideas concerning this matter.

Here is a nice letter from Alice Anderson in Philadelphia. Our cruise ship was delayed in February in docking at Philadelphia, so we missed seeing Alice and the group there. Better luck next time. "I am so very sorry to have missed seeing you in Philadelphia, but **Henry Daley** told me that they did not see you either. I had planned to entertain you and Frances at the Art Alliance either for lunch or dinner. I leave April 7 for a World Affairs Council trip to the Orient, Japan, Hong Kong, Thailand, Taiwan and Hawaii. I'll try to stay over for five extra days in Honolulu. I attended and enjoyed the M.I.T. Delaware Valley Conference at the Sheraton Hotel here on March 9. Dick Jones, '48, sent me a very nice invitation. I saw the Walter Beadles ('17) from Wilmington, whom I often meet at the Philadelphia Orchestra concerts and I shook hands with Dr. Killian. I met many other M.I.T. people from Philadelphia, whom I have known. I hope that you both will come to Philadelphia again and will visit me at the farm." We, too, hope we can get there some time. It's so nice to hear from Alice. Notice how short the column has been getting lately—"help, help!"—**Azel W. Mack**, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

## 16

Here we go again—June 7, 8 and 9 for our 52d Reunion at Chatham Bars Inn, Chatham, Cape Cod, scene of many of our best off-year reunions! As our ever young President **Ralph Fletcher** says: "In years gone by this has been a great location for us, and the arrangement of separate cottages with a few choice locations in the main house has always worked out very nicely. Interest continues high in these annual reunions and from all indications in personal contact and correspondence, many classmates and their wives are planning to attend. It may seem like a great deal of effort for a weekend on the Cape but this isn't just any ordinary weekend. We all enjoy ourselves and greatly benefit from this annual contact with our classmates. We sincerely hope that you will be with us this year." . . . Our worthy Assistant Secretary took off to the Caribbean for the month of March, after properly directing some of the grist for news mill, and is making us feel quite noble for staying at home instead of covorting and lazing and basking in the sunshine of the islands down there. He and Dolly are quite taken with one spot, Young Island, a 30-acre paradise island a hundred yards off shore from St. Vincent, with a limited number of cottages at various levels from the shore line to about 100 feet up the hill, reached by stone steps, "the nearest thing to Heaven-on-earth," as they put it. "As one is served at dinner, food is not merely placed before you, but

always a 'please' at the end of it, 'e.g., conch stew, please,' with a lilt." (The next time you see Peb, ask him to do a Young Island lilt for you.) "One noticeable thing about the guests is their age, many in their 40's and a few ancients like ourselves—all people you're glad to be with. When we were 40 none of our friends or we could afford a winter junket like this—must be the affluent society. As to what we do, the answer seems to be 'If you ask that question you don't belong here,' to paraphrase J. P. Morgan's comment on his yacht *Corsair*. Actually, things to do include: snorkeling, watching schools of brilliant tropical fish, 'record shot' picture taking, visiting the botanical garden (the best in the Caribbean), the arrowroot factory and a whaling station, climbing to the crater of an extinct volcano and sailing on three-hour cruises." Further, says Peb: "Went to a fishing village up the coast the other day and wished we'd had clothes pins for our noses. The biggest product is black fish, a small whale of 500-1500 pounds which they harpoon with a gun. The small ones they haul into their sailboat and cut up on the way home. Same for the big ones but they cut them up piecemeal, hauling in a part and cutting it up, then haul in some more, etc., etc." From his general description, one can see that Peb is a good one to contact if you want to know where to go and like it!

At the end of February we had a card from Ethiopia, with butterfly stamps, from Vi and **Herb Mendelson**, and the card was an Ethiopian painting *The History of the Queen of Sheba*. At the Reunion, ask for it if you want to see it. Says Herb: "After a four week safari in the Mt. Kenya region among the Sanburn and Turhana, we flew to Ethiopia. It's a wild desolate volcanic land. Little change from Queen of Sheba's days. Unfortunately she was not around. Addis Ababa is a modern city (in part) and the Guron Imperial can compete with the Waldorf." . . . We have had word from **Mark Lemmon**, a name synonymous with "architecture" in Dallas, who still keeps in the "doing" category in spite of everything. Here's how he explains it: "About five years ago I quit seeking any commissions that required planning, but since that time I have been conducting an office devoted to consulting work, and thank goodness I have been very busy. It is time for me to retire, I know, and I expect to on September 1 of this year when I finish my present work load. This consulting work has been very satisfying as I do not have to work very hard and I have abbreviated office hours. For a number of years we have been going to Europe for our vacations and last year we spent three weeks in Paris, a city my wife and I are very devoted to, but I am afraid it is losing its savor due to the French attitude toward the Americans. In fact, it is very hard to find a country in which the American tourist is welcome, as you of course know. Being so far away



from Cambridge I do not see many M.I.T. people, certainly none of my generation. I do see General Frank Bell, '10, socially every once in a while; although he is 81 he is very robust and very active, and a most loyal graduate of M.I.T." Mark says he is still playing golf regularly, which is his chief hobby, and a game which can be played in Texas the year-round. In conclusion he notes: "As a participant in both wars I view with considerable sadness the conflict our country is having in South Vietnam, and too, the discouraging conditions of our great country."

**Vetrees Young** of Bogalusa, La., as one of the trustees of Trinity College in Hartford, says that problems of a new and bothersome kind are arising more and more often these days. Says he's quite sure that while we were at M.I.T. we had enough work to keep our minds on our studies. He notes too that the election this fall might wind up the House of Representatives, so some may consider throwing their support to the various campaign funds to see what can be done to increase the strength there. . . . From our only correspondent in Dowell, Md., "Loveable Old Frank" **Hastie**, comes this opening introduction: "I am like the kid in the dialogue: 'Where have you been?' Out. 'Whom did you see?' Nobody. 'What did you do?' Nothing." Then Frank has a bit of good news to report: "The only thing I have worth mentioning is Frank, Jr.'s, safe return from Vietnam after his year's tour there. I don't know what actual dangers he managed to avoid and left unmentioned to save his mother's feelings. All I know that actually happened to him was when this nearby ammunition dump was detonated by V.C. or N.V.N. mortars and there was a fireworks display which kept them ducking for several hours, during the course of which their field laundry burned up—the one at which he happened to have almost all his clothes. But after losing my oldest son in Korea, I felt I was entitled to a break in Vietnam."

**Dick Knowland** down in Largo, Fla., gives us something to ponder when he writes: "Nothing very adventurous has happened recently to us. Living as we do, close to the 11th hole of a golf course, one might think that we would play, but right now we simply watch with something near to consternation, the duffers, no older than we, who are playing. I don't think that I wish to join them in my declining years but will stick to the roses and a little fishing. Kay is at her usual occupation with garden club work (I do all the growing, incidentally). There is little exercise in all this, but I recall old Chauncy Depew's classic remark that he got all his exercise from attending the funerals of his friends who took it." . . . Straight from **Dave Patten** of South Duxbury comes this interesting bit and suggestion: "The speaker at our M.I.T. Alumni monthly luncheon today, March 14, is the son of our distinguished classmate,

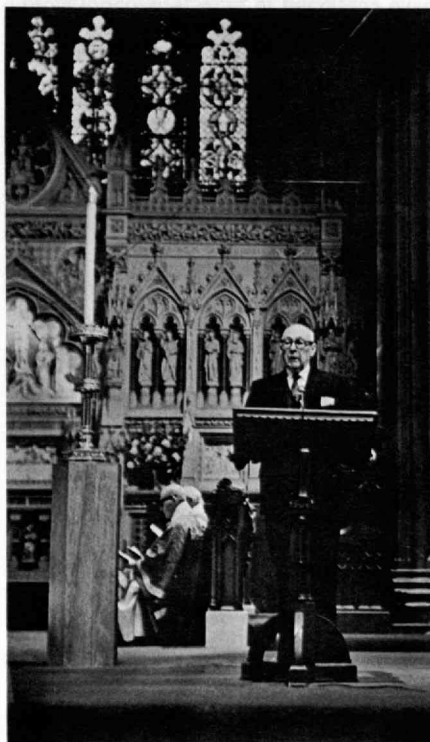
**Vannevar Bush**. As President of Millipore Corporation, John Bush will discuss the problems of a developing small business. While I attend these luncheons regularly, I see only one other regular '16er, **Dick Hunneman**. He has the reputation of being a loyal class member both at Harvard and Tech, and since he is a distant relation I can take a little pride in that. Arch Morrison and Azel Mack, both of '15, and 'Brick' Dunham, '17, are regulars. Time, 12:00 noon; place, Old Oyster House, 41 Union Street, cost, \$2.50. Come be my guest (and ease the strain by using a Millipore filter)!"

Not so long ago Elsa Mueser asked how many classmates are still not retired. She quite agreed that to answer the question we would first have to define the word "retired." Of course the fact is, there are quite a few, such as **Merrill Pratt** reported in the April notes, **Mark Lemmon** reported this month, and around New York, '16ers like **Herb Mendelson**, **Walt Binger** and **Ken Richmond**. And this month we have another one to report, **Harry Lavine**, whose letterhead says "Life Underwriter" with Equitable Life. Here's how Harry puts it: "To the extent that nature and science prevail, I can be found daily at my office. The word 'retire' is anathema, taboo and verboten. Even if my entire clientele were obliterated, and I survived and retained my faculties, I should be able to rebuild; that's the nature of my business." He and his wife do have opportunities to visit their daughter and family in Westbury, Long Island. They are pleased to note that one granddaughter seems to be headed for Mt. Holyoke

and the grandson for M.I.T., Harry "hopes." Then he writes: "My other activities consist of officership and membership of the Board and Executive Committees of our Temple and Brotherhood—Anti Defamation League, B'Nai Brith, etc., and my dear wife is confronted with only limited time to engage productively in oil paintings, Braille teaching and transcribing, proving that we are all becoming what we all will some day be."

Back home in Birmingham, Mich., **Cy Guehing** reports that he and Gyps had a 50th anniversary party with friends in Delray Beach, Fla. Furthermore: "We were guests of **Ted Jewett** and Allie at the Hillsboro Club at Pompano for lunch last month. They both looked wonderful as always. Learned that they will probably pass up our 52d as they will be at Hotchkiss during that period, but send their best wishes to all 'the faithful.' When in Clearwater, we dropped in at the Bellevue Biltmore to see Don Church (formerly of Oyster Harbors) and **Dick Knowland**. They send their best wishes to '16ers—the best class that ever congregated at Oyster Harbors. We hope to be at the 52d. We expect to be at Spruce Point Inn at Boothbay Harbor this summer. We will surely hope to see **Charlie Reed** and Millie down Maine." . . . And a nice letter came from **Milton Schur** whose Olin, Packaging Division letterhead lists Milton as Vice President, Research and Development. He says: "The years gallop by with disconcerting speed. Last September our son was host at a party for his mother and dad on the occasion of our 50th Wedding Anniversary. Our son, Bud, is enthusiastic about his work as Associate General Counsel for the Atomic Energy Commission. I am still active in industrial research with headquarters in New Haven working on the development of new products, while watching the sales of earlier developments continue to mount. This I find is the best way to stay young while growing older. Perhaps now that foreign travel is being discouraged, I may be able to make the next reunion."

**Merrick Monroe** of Noroton, Conn., writes that life goes on about as usual. When asked what he does to keep busy and unboiled he answers: "Anyone who owns property (that is, buildings) has plenty to do just keeping even with the necessary maintenance, to say nothing of projects which may be dreamed up from time to time." He tells how the Brooklyn dock strike in October prevented their takeoff on a 50-day cruise in the Mediterranean and how the rental of their home forced them back to Maine. "Our house in Maine has no heat other than a fireplace, and the water had been turned off, so we roomed and boarded at a year-round boarding house at the head of the lake where they cater to summer-camp parents, apple-pickers, deer hunters, skiers, fishermen, etc., etc.—plenty warm, good beds, excellent home-cooked meals, farm style."



Joseph W. Barker, '16, read the Old Testament Lesson instituting the new Liturgy in Trinity Church, New York, on Sunday, January 21. Dr. Barker is Church-warden of Trinity Church

Back home after Thanksgiving." And speaking lightly, Merrick adds: "The only real fly in our ointment is that we feel we should read the newspapers, but we really do not want to. But we cannot play ostrich entirely. But all in all, we are well. At my annual medical check-up several weeks ago, my doctor said I would live forever provided I lose 25 pounds. We don't owe anyone any money, we eat regularly, so, what more is needed?" . . . This is the way **Arvin Page** puts it when he regrets a delay in acknowledging a card or letter: "The fact of the matter is that I have been so steadily engaged in doing absolutely nothing that I have not had the time until today when there is a slight break in my schedule." Arvin's handwriting still looks like the near-perfect lettering we learned to do on the top floor of Rogers in 1912-13.

**Francis Stern** returned to West Hartford from Palm Springs on April 1 and presumably then started thinking about fishing. This time he and Gladys were not able to make contact with Kay and **Irv McDaniel** in Newport Beach, Calif. Francis says their grandchildren seem to be progressing well. Their granddaughter, a sophomore in the University of Chicago, came home on spring vacation with straight A's, and their grandson is working on his doctorate in math at Yale, some kind of math that Francis will "never understand." . . . **Willard Brown** in Santa Barbara writes: "We continued to live a very active life here. Just last week for example I was out eight straight nights in a row" (how can he do it?)—"one of them, by the way, was to meet with Robert Hagopian from the Alumni Association in Cambridge, resolicitation for funds among the considerable number of alumni here, thanks to G-E's and G-M's 'think tanks' centered here. I was sort of advisor to the younger fellows." He tells of having lunch with Hagopian "in our delightful (and fine food) El Paseo restaurant. It is in the oldest old-Spanish group of buildings in town, open to the sky with half-opaque curtains which can be pulled in case there is a change of weather. To paraphrase *Oklahoma* there is almost always fine sunshine here." . . . **Al Iovenberg**, who for years has written from Springfield, now writes from La Jolla where he was advised to go by his doctor to avoid New England's humid spells and to get away from snowy and icy roads. Now with their daughter who has lived in La Jolla for 10 years, they are also closer to a second daughter in Colorado, whose husband, a retired Air Force Colonel, is developing a 4,700 acre ranch between Denver and Colorado Springs. Quoting **Bill Leach** in our March column about "one of the best ways to keep healthy is to keep busy," Al says: "I am going to teach at the U.C.S.D., Adult Extension course—Practical Air Conditioning." And again our 50th Reunion red blazers get special mention as Al finishes with: "Attended a party at Chancellor Galbraith's home and wore my reunion

jacket. There were others with similar representative emblems but mine attracted most comment."

**Jim Evans** stays quite busy five days a week at what he calls the A.B.E. school (Adult Basic Education) in Paterson, N.J. Says: "I have the senior class in science and math and it is real fun and work which doesn't hurt anyone. The students range from 22 to 45 and have or have had anywhere from two to nine children." And we have a poem that Jim wrote for **Walt Binger's** 80th birthday in January which starts and finishes like this "To Walt Binger's birthday fest,/We fear we cannot go,/ But thought we'd send a poem instead,/ If only just to show,/That we will think of you that night,/(Present in spirit, If not in form)/And wish that we could share the sight,/Of friends bestowing wishes warm . . . Another 80 for Walter Binger,/Our favorite chauffeur—fox hunt—swinger!" . . . We have one of those fine unsolicited letters from **Phil Baker** in Grosse Point Shores, Mich., with comments on some of our illustrious classmates mentioned in recent columns—**Len Best** who passed on in December, **Hovey Freeman's** great family, and the **Bill Leaches**. He notes: "It is wonderful that such fellows as **Dick Berger** can do such rewarding and useful work. It must be very satisfying." Phil and Thelma had just returned, at the end of March, from a "visit in Florida followed by a 25-day cruise to Lima, Peru. Fine weather, placid seas and a congenial crowd (of 90) made it a most pleasant trip." . . . Finally, all ready now for the 52d at Chatham Bars Inn June 7, 8 and 9. As our Ralph has said before, it will be a relatively quiet weekend, but with friendships that have continued to grow throughout more than half a century. We appreciate your good responses to our many requests and once more ask that you write a little but write often, to keep our column full and interesting.—**Harold F. Dodge**, Secretary, 96 Briarcliff Road, Mountain Lakes, N.J. 07046; **Leonard Stone**, Assistant Secretary, 34-16 85th Street, Jackson Heights, N.Y. 11372

## 17

You will recall **Dix Proctor's** report in last month's notes of his trying in vain to see **Poh Y. Hu** at the University of Malaya. Dix wrote to Poh and asked him to let us have news of him. The following is gratefully received under date of March 25th: "I received a letter from Dix, the 1917 Class Secretary. He was taking a world trip aboard a Dutch freighter which stopped in Kuala-Lumpur for just one day when I had gone to Ipoh to attend a wedding. I'm very sorry to have missed an old classmate. I was retired from the Faculty of Engineering, University of Malaya, three years ago because of my age. Since I was a Visiting Professor (eight years) no pension is allowed. After graduation, Course III, in 1917, I entered petroleum engineering in

Pittsburgh University in 1918 and then worked in several iron and steel works around Pittsburgh during World War I. I returned to China in 1919 and was in charge of the erection of the Lungyen Iron Works, 10 miles west of Peking, now known as the North China Iron and Steel Works under Communist China. This 300-ton blast furnace designed by Perin and Marshall Company of New York was not blown in because of a drop in iron prices when erection was completed. I was later employed by Tayeh Iron Works 90 miles down river from Hankow, and was in charge of two 500-ton blast furnace for five years until 1928. I accepted the position as the first Director of Mines when the Republic of China first came in. I also held other jobs such as Assistant Professor in Central University, Nanking, and President of Chia Tung University. During the Sino-Japanese War and the Second World War I was the Director of the Technological Department in the Ministry of Economic Affairs until V-J Day."

"By the appointment of the Chinese Government, I went to the U.S.A. in the spring of 1945. My mission was to study the heavy industries as the liaison between the Chinese government and Arthur McKee Consulting Engineers in Cleveland who had a contract to design iron and steel works in China. I returned to China in 1948, just five months before the fall of Nanking. Because of a trip to Taiwan, I did not have the opportunity to bring my family out of mainland China. I lost everything I had. I went to the U.S.A. in 1950 as a refugee and worked at Columbia University for a living. Luck was against me in my old age. My only son, who was educated at Manchester University in England, was accused of being a reactionary. He was arrested and dispatched to a concentration camp on the border of Soviet Russia and Manchuria for a term of seven years. He lived where the temperature was 35-40 degrees below zero, wearing only cotton clothes and eating crude food (not ever given even a single meal of meat throughout the year). I thought seven years very short for a young man, but he died after three years because of cold and hunger. My wife died upon learning the death of our only son. He left two daughters and two sons as well as his wife."

"With much difficulty I succeeded in getting a grandson out of Communist China. Last summer he was graduated from high school in Hong Kong. He is now a freshman at M.I.T. He was awarded a \$1000 scholarship and has a \$900 student loan. His name is Chi Kuan Wu, alias C. C. Hu, Mail Box 4346, 420 Memorial Drive, Cambridge, Mass. 02139. With my present financial condition, I expect him to get a better scholarship next year. Please help him if possible. Kindly show this letter to Dix. Sincerely, P. Y. Hu." (Note from your Secretaries—There



has not been time to meet the grandson Chi Wu but we certainly will soon. Your Secretaries will appreciate any thoughts and suggestions that any of you may have of how to help Chi Wu for we are sure that that is what we want to do.)

Last fall **Walt Whitman** served as a judge on the selection panel of the American Institute of Chemical Engineers which was to recognize the 10 outstanding achievements of chemical engineering. . . . **Al Lunn** has been re-elected Treasurer of the Cambridge Redevelopment Authority. He served as President of the Authority a few years ago. He certainly does a job for Cambridge. . . . Honorary member **Don Severance** with wife Phyllis skated the "Fourteen Step" dance to plaudits in the recent "Ice Chips" show of the Skating Club of Boston. . . . The Brae Burn Country Club (April 17) was the happy scene of the 50th wedding anniversary celebration of **Stan Lane** and Helen. . . . **Brick Dunham** and Edna are having a dose of difficulties. In March Edna fell, at home, breaking her right hip and right shoulder. She is now recuperating at home. Meanwhile, Brick had a hernia operation and is returning to normal. . . . Thanks to **Dick Leongard** we have word that he and **Bill Hunter** were the only '17 representatives at the '16-'17 Chemists' Club luncheon on April 2 whereas Gruber, Richman, Dodge, Mendelson, Stone and McCarthy were there for '16.

The following letter has been sent to Class widows and is self explanatory. "Just about a year ago, our committee wrote to you about the 50th Reunion plans of the M.I.T. Class of 1917. Several of our Class widows were able to attend and we received warm letters from many others. As suggested in our letter of last year, we hoped to present to the Institute a tangible memorial to those classmates who are no longer with us but whom we shall always remember. **Al Lunn** referred to this possibility in his remarks at the Reunion dinner and again in the Class notes in the *Review* last fall. An informal committee has been working on this and has developed a project which we believe you will agree is original and most appropriate. To the Class of 1917, the Rogers Building was a tie to the past and at the same time symbolic of the future, since our Class moved from Rogers to the new Institute on Memorial Drive in 1916. Our classmate **Nelson Chase**, who is an outstanding artist, has agreed, for a very modest fee, to do a painted tapestry of the Rogers Building as a memorial gift. It will be hung in the President's Office Suite at M.I.T. where thousands of people pass each year. Since President Johnson is an honorary member of the Class of 1917, this location seems particularly appropriate. At Reunion time last year, several widows made contributions to our Class Gift. We have arranged to have these gifts transferred to the fund for the Memorial

Gift. Since the memorial will be presented in the name of the widows of the Class, we wanted to give each one of you an opportunity to contribute if you so desire. Please do not feel that there is any obligation, but we shall be grateful for all gifts, small or otherwise. Checks should be drawn to the order of the Massachusetts Institute of Technology, and these gifts are tax deductible. They should be mailed to our Class Treasurer, **Stanley M. Lane**, 85 Old Colony Road, Wellesley Hills, Mass. 02181. We are very hopeful that the painting can be unveiled on Alumni Day, June 10, 1968, and that you can be present for the ceremony. Sincerely yours, Betty Hulburd, Anne Parker, Conchita Lobdell Pearson, Philip N. Cristal, Memorial Gift Committee" (Secretary's note—Nelson's early renditions are exceptionally attractive and we are enthusiastic over the project.)

We have received the following changes of address: **K. M. Lane**, East Madison Road, Madison, N.H. 03849; **Han H. Huang**, 616 Forest Avenue, Apt. 7, Palo Alto, Calif. 94301; **W. B. Newell**, 523 East 45th Street, Savannah, Ga. 31045; **W. F. Pond**, Box 291, Graybull, Wyo. 82426; **L. C. Roberts**, 507 Ellis Hollow Creek Road, R.D. 2, Ithaca, N.Y. 14850; **P. N. Rowe**, 237 Beechwood Avenue, Middlesex, N.J. 08846; **W. B. Hunter**, 185 Main Street, Farmington, Conn. 06032. . . . Mark your calendar now for our 51st Reunion at Sturbridge Inn, Sturbridge, Mass., October 9 and 10. It is the consensus that Sturbridge is best suited for location, accommodations, attractions and the time of the fall foliage. The mid-week dates are good for our vintage and hotel accommodations easier to arrange. Just before the October 12 holiday has been found to have advantages. **Dud Bell** has consented to be Chairman of the Reunion Committee and you will be hearing from him, but mark your calendar now.—**C. Dix Proctor**, Secretary, Box 336, Lincoln Park, N. J. 07035; **Stanley C. Dunning**, Assistant Secretary, 6 Jason Street, Arlington, Mass. 02174

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There is something special about college classmates, particularly as we approach our 50th Reunion. Most always it is memory by which we gauge our sense of gain or loss. Azel Mack, Secretary of the Class of '15, writes to say he owes a great deal to the camaraderie and friendship of his classmates. "How would one explain this feeling among us which is closer, more concerned, more sincere than the friendships between the usual business or social friends? What created the call-me-at-three-o'clock-in-the-morning attitude that has actually been felt and followed by some of us?" He asks, because the wife of one classmate, herself a college graduate, queried with eyebrows aloft and nose at angle theta, "Really now, what is there that keeps you men

together? It must be the little boy in you." Quite the contrary, gentle lady. Perhaps Major Cole was right when he told us freshman year that M.I.T. students were a breed apart. We didn't know then whether to believe him or not. Looking back from effect to cause, it couldn't have been that we roomed in the same dorm or belonged to the same fraternity. Many of us didn't. Furthermore, the miracle still happens to some who experienced little contact as students. It wasn't even that we all took some of the same courses. The bonds of fortitude and of delicacy which hold us together are a weld of other flames and of more durable anvils. There was a warm pride in our knowing that we were on the growing edge of something. There was flux in our sharing tough problems in the laboratory and into the midnight hours. Sometimes we achieved the thrill of surpassing ourselves, and that evoked something from within. It was a disinterested cooperation between equals. The bond was one of sharing, sometimes shared all the way to the bone. Don't overlook the fact that a sharer can share only with another sharer. It cannot be one-sided. That is no more than give and take. We shared enthusiasm for ideas. Ideas change, but the enthusiasm for them never does. It is a different kind of bond than those created by commerce or the country club. Something happened because we learned that nothing is any more accurate than the precision of its least truthful component. It made a difference that we were required to prove things instead of just to express an opinion. We shared concern for personal growth, sometimes teaching each other the primary need to first be friends with ourselves. No man can give what he does not possess. We changed from polliwogs into frogs, not only in the same pond but using some of the same lily pads. Among the strongest things in life is truth, and there is reason to believe that as far as lasting friendship is concerned, the two are only different aspects of the same thing. Such friendships have no need for constant repair. Despite years of no contact, they readily run again at full throttle. From them comes the magic in the memories of those who have labored and suffered growing pains together. Oh no, gentle lady, it isn't the little boy in us. Without so much as a touch of overemphasis, it was the heat and the hammering we experienced which gave, not all but many of us, a mutual feeling of being boys no longer. We became men together, and we knew it.

**George Sackett** (12 Gulfview Court, Milford, Conn. 06460) says: "Marie and I were at Wianno for our 45th, where we caught old ties in the very act of rhyming. Of course we eagerly look forward to June. Because I've never been back to the campus since graduation, that part of the program will set echoes flying. What a happy and jubilant thing it will be to see the old friends again—Harold Weber, Arthur



Smith, Max Seltzer to mention a few. My life reined into a walk when I retired in November, 1966. I keep in contact with old tire retread activity by submitting articles for the trade journals, and find being given immortality in print a rewarding experience which is not too demanding." . . . **Fred Philbrick** (552 Miller Road, Coral Gables, Fla. 33146) has a new as well as a renewed heart beat for us. "Last June I had to have a pacemaker to control my heart action. The results have proven excellent. Actually, it's a minor miracle. Where the pulse was 40 and the blood pressure 230, the figures are now 72 and 155. Ten years ago this would not have been possible. You see how it pays to keep on living. Hildegard and I look forward to Reunion with glowing impulses." . . . **Gretchen Palmer** (335 South Tremont Street, Princeville, Ill. 61559) says: "These last 50 years the diagrams of my destiny have taken me into various activities seeming far from chemistry. Like **George Ekwall**, I deserted the laboratory and landed in the arms of the church. Our old friendships have sustained me many times, including last December when my roommate-in-retirement died. In February I was in Buffalo for the joyous consecration of the new bishop coadjutor. Because he is a member of my family it was quite a reunion. Now one of another, but also happy, sort is coming up. This time there will be no exploding box of fireworks for me to flee in confused disorder, but there will be fine and jubilant things. See you there."

Courtesy of **Max Seltzer**, I have a copy of **Tom Brosnahan's** account of his trip to South Africa via Europe. Tom explains that a Boeing 707 flies 550 miles an hour, six miles up where the temperature is 60 below zero. It uses 3,400 gallons of fuel per hour. After a day in London, they flew south to Johannesburg, stopping at Rome and Nairobi for gasoline. "It is a thriving city of more than a million people, literally and figuratively built on gold. Some mines are now 15,000 feet deep, producing enough air pressure to require gradual descent and ascent to avoid the bends. Kimberly, the diamond city, is only an overnight train ride away. The daily production is about two pounds from 15,000 tons of ore. Only 30 per cent of the diamonds are of ornamental value. The rest go to industrial use. Another overnight trip took us to Cape Town. The main industry there is shipping. We saw vessels from many countries, including one from the United States. It was unloading a cargo of private airplanes. We drove to the Cape of Good Hope where the Atlantic meets the Indian Ocean. On the return trip we passed a group of gray baboons. They were very tame, climbing onto the bus to beg for food. At Port Elizabeth we visited the Oceanarium and the Snake Park. The latter containing more than 400 of the most poisonous snakes in South Africa. A trained attendant handles them without fear and explains their characteristics. Durban is one

of the most fascinating, cosmopolitan cities in the world. One can enjoy gracious service and the special foods of many cultures, all the way from Scandinavian smorgasborgs to Chinese and Indian dishes. There were rickshas so shaky that it is more difficult for the rider to hold his seat than on the back of a frolicking horse. It is a funny, uncomfortable, thrilling experience. We visited Natal University, set on a hill overlooking the entire city. We travelled along the east coast for several days to the Kruger National Park, an area of over 1,300 square miles entirely surrounded by a fence. This provides a protected refuge where wild animals may live and propagate, secure from man. During two days in the park we saw white and black rhinoceri, impala, wart hog, baboon, zebra, giraffe, hyena, elephant, hippopotami and crocodile. The male lion stalks game and drives it within striking distance of the lioness who kills it. But he eats first, to be followed by her. The cubs come next. After them the hyenas, and finally the vultures. In Pretoria there are splendid government buildings. On its outskirts natives live in circular, abode, one-room houses. When a young native wants to marry he gives the girl's father 12 cattle worth about \$150 apiece and takes the lady on approval. If she becomes pregnant within nine months the couple is married. Otherwise, the cattle are returned together with any calves produced and the girl spends the rest of her life as a domestic servant or whatever other employment she can find. On the way home last August the temperature at 31,000 feet above the equator was 33 below zero. From Johannesburg we made the 11,733 miles to New York via Europe in 29 hours and 40 minutes. We were happy to get home to a good night's sleep."

**John Kennard** (1 Euclid Avenue, Summit, N.J. 07901) reports that he has fulfilled all the prerequisites for a resplendent Reunion. "Ida May has strict instructions that if I should be summoned to the Pearly Gates before that '18 blazer arrives, I am to be held in condition until it is available so I can be laid out in it. And, **Eli Berman**, it jolly well better be a good fit or I will haunt you. The Kennards have sold their home. We now live in an apartment the address of which, in view of my mastery of three branches of geometry—plain, solid, and descriptive—reflects glory upon an old thinker wearing sandals and toga. We had to move because I could no longer produce sufficient induced magnetism to get Ida May to mow the grass. The fact is, I haven't done anything useful since retiring five years ago, with the possible exception of trying to arouse the brethren to the glories of a march on the Wianno Club at Osterville a few weeks hence. Perhaps, as you once wrote, we shall find out where we are in the timetable of our lives. But we shall face it with confidence on an occasion touched by the beauty of refreshed memories. Life's hardest lessons

have been learned by now if we're ever going to learn them. How I look forward to seeing everybody there."

The following have made reservations for the Reunion, most to be accompanied by their wives: **Stuart M. Boyd**, **Eli Berman**, **Carl W. Blanchard**, **Thomas V. Brosahan**, **Malcolm J. Baber**, **Henry A. Berliner**, **Harold E. Collins**, **William L. Collins**, **Philip B. Craighead**, **Samuel Chamberlain**, **Charles E. Dimock**, **Charles W. Dow**, **Clarence C. Fuller**, **Rolfe A. Folsom**, **William C. Foster**, **Saxton W. Fletcher**, **Donald Goss**, **Moss Guilbert**, **Julian C. Howe**, **William A. Jones**, **John W. Kennard**, **John Kilduff**, **Nathaniel Krass**, **Thomas M. Knowland**, **Henry R. Lacey**, **Herbert B. Larner**, **Harry C. LeVine**, **J. Edward Longley**, **F. Alexander Magoun**, **Bruce W. McDill**, **Hall Nichols**, **John R. Poteat**, **Gretchen Palmer**, **Frederick B. Philbrick**, **R. Robinson Rowe**, **Walter H. Robertson**, **Arthur Smith**, **George A. Sackett**, **Granville B. Smith**, **Philo S. Shelton**, **Franklin K. Wells**, **Charles H. Watt**, **Harold C. Weber**, **Sumner K. Wiley**.—**F. Alexander Magoun**, Secretary, Jaffrey, N.H. 03452

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Last call for Alumni Day '68 on Monday, June 10, in Cambridge! Phone the Alumni Association for reservations for you and your wife, if you haven't already sent in the application you received. Hop a plane and meet the '21 gang at dinner time on Sunday, June 9, at the Charter House Motor Hotel at 5 Cambridge Parkway, Cambridge, just down Memorial Drive from Technology. . . . We have received a very welcome letter from Graciela and **Helier Rodríguez**, which says, in part: "Your long letter reached us in Puerto Rico. We were delighted to hear from you and very grateful because you took the time to write us at length. Our heartiest congratulations to you both, for the success of your book and for Mac's serious accomplishments in her pictorial work. I saw, in the January issue of the *Review*, your class notes referring to the old clothes for Cuban refugees and also about the calcinator. We appreciate your help. It takes a long time for packages sent by ordinary mail and it is possible that many have been sent by members of our Class and are still on their way. Living conditions in Cuba are at a low level. A young man who recently arrived here has given us a realistic picture of the situation—actually below the lowest standards. The prevailing bad feeling and anger against the government is voiced by women standing in the food lines since before day-break, who insult the policemen trying to keep them quiet; but the men in the same line do not dare speak for fear of punishment they might receive. Recently, all Havana night clubs were ordered closed; all small businesses, with no exceptions, have been confiscated and nationalized. People who have applied to leave the country are

forced, while their permits are pending, to cut sugar cane in the fields. When we arrived here at the end of January, we prepared two 35-pound packages of food, to be sent to Graciela's aunts in Havana by air freight, the way we had been doing it before. The airline refused to accept the packages because the Cuban regime has now forbidden such shipments. It seems unbelievable that things like these are happening in this age of civilization. Our trip was longer than we had expected. We stayed in Puerto Rico three weeks longer than we had planned. While there, due to a bad case of gripe, I was unable to attend a meeting of the M.I.T. Club of Puerto Rico on December 28, when President **Howard W. Johnson** was present. I had gone to an earlier meeting in November and was very happy to meet the local alumni. On our return trip from Puerto Rico, we stopped for a week at the Canary Islands. We had never been there before. It was interesting to explore these volcanic small islands, off the coast of Africa, where people from northern Europe like to go to enjoy a subtropical climate. We saw flocks of tourists from Scandinavia. Remember us to Ellie and Joe, and to Al and Marie. We are thinking of moving over to Florida in the not-too-distant future. Our best wishes to you both." Graciela also added a personal note. It is a source of great personal pleasure to know that this grand couple may once more be located nearer to all of us and thus afford more frequent opportunities to see them in person. For those who may have mislaid the January *Review*, the address to which warm coats and clothing may be sent is: Miss Cristina Fernandez de Oleaga, Caritas Nacional, Depto. Extranjero, Ropero de Cubanos, Santo Domingo 5-2° Piso, Madrid 13, Spain. As indicated at that time, there is a pressing need in Spain for used overcoats in good condition and for other warm clothing for large number of Cuban refugees who are arriving constantly. Your use of this address will avoid the payment of duty and will expedite handling when the packages arrive in Spain. We're still interested in passing along to Helier your suggestions as to individuals or industrial concerns you know who might be interested in a novel design of calcinator for rapid continuous processing of gypsum, plaster and lime. Tell us and we'll see that your much-appreciated assistance is forwarded to Helier.

**Samuel E. Lunden**, senior partner of the architectural and planning firm of Lunden and Johnson, Los Angeles, Calif., represented M.I.T. at the inauguration of Charles Johnston Hitch as the thirteenth President of the University of California at Los Angeles at the end of last month. Sam donned M.I.T. regalia for the academic procession and took part in the various observances which preceded and followed the actual inauguration ceremony. . . . Oliver P. Bardes, son of our own **Ollie Bardes**, is, we discover, the President

of Decision, Inc., of Cincinnati, Ohio, a leading placement and recruitment service for qualified professional personnel. Young Oliver organized these extensive services and has headed the organization for 17 years. . . . **Frank H. Whelan** writes that the consulting engineering firm of which he is President and Treasurer, Frank H. Whelan, Inc., has moved from its longtime location at 11 Beacon Street, Boston, to new and larger quarters at 1616 Soldiers Field Road, Boston, Mass. 02135. Dinnie also continues active as a real estate appraiser and member of the Boston Real Estate Board and the Massachusetts Board of Real Estate Appraisers. A former Vice President of the Boston Association of Structural Engineers, he has chaired its committees to revise permissible live and dead loads and the reinforced concrete requirements of the Boston building code. He is the author of "Draft for the Proposed Amended Part 23 Live and Dead Loads of the Boston Building Code," published in the *Journal* of the Boston Society of Civil Engineers. He also holds membership in the American Society of Civil Engineers and the American Concrete Institute. He and Anna have been faithful attenders at '21 reunions and Alumni Day meetings, usually with their daughter, Anne Dennison, who serves as purchasing agent of Frank H. Whelan, Inc. The Whelans have two married daughters and two sons and one grandson.

**Miles M. Zoller**, 200 Fairway East, Tequesta, Jupiter, Fla. 33458, retired in 1963 as Vice President, Director and General Manager of the Chemical Division of Eagle Picher Company. He is now Vice President and member of the Board of Governors of the Tequesta Country Club. Helen and Miles have four married sons and seven grandchildren. . . . **Girard B. Troland**, 36 Woodland Road, Lexington, Mass. 02173, retired as Colonel, Corps of Engineers, after 36 years in the U.S. Army. . . . **Hugh F. Peirson**, 1147 Mattingly Road, Hinckley, Ohio 44233, says he is enjoying his retirement endeavors in farming. Hugh retired in 1964, having served W. S. Tyler Company of Los Angeles for 41 years in mechanical and sales engineering capacities. He is a member of the Society of Automotive Engineers and a Scottish Rite Mason. During World War II, he was a Captain in the Cleveland Ordnance District of the U.S. Army. Hugh says he also enjoys travel and we hope he'll be with us for the 50th Reunion—and in Mexico, if we go there again before 1971.

Mid-February greetings penned by **Ralph M. Shaw, Jr.**, on the stationery of the Sandy Hotel say, in part: "Greetings from Barbados. I enclose a full set of stamps for your collection. These are new stamps since last year. If there are any new ones from Virgin Islands I will send them later. We are having a lovely time. There are no M.I.T. alumni here and, hence, no members



Mr. and Mrs. Ralph M. Shaw ('21) enjoy traveling. Last summer they visited Nome, Alaska, where this picture was taken.

of '21. There is nothing to do but eat, sleep and swim. It is fair and hot. Independence may be swell but the exchange rate has become 2 to 1 instead of 1½ to 1. The sugar boys are on strike and the boilers cannot sell at new prices, so the crop has not been cut. I imagine the country will go broke next year. Great life! It never pays to be a hog. The cost of growing plus the cost of harvest plus the cost of boiling plus the cost of selling must be less than the sales price. The cutters are demanding a raise which means that the crop costs more than the price at which it can be sold. Therefore, they are not selling it. The crop is still in the field and the mills are idle. They will not suffer until pay-off. Then I will not be here. When there is no money a lot of people will gnash their teeth and wring their hands. It would be funny if it were not so serious. Wonder if L.B.J. will give them some 'aid.' Bet you he won't." Thanks to Rufe for a gorgeous series of stamps and his usual interesting letter. It's nigh impossible to keep up with the travels of Madeline and Rufe but you may get an idea of the never-ending variety of their jaunts from last year's picture of them in Alaska.

Helen and **Ray St. Laurent** are about to start a vacation trip to Florida as we write this, with frequent planned stops on the return journey to see the spring flowers appear as they travel north. We're hoping they will stop over in Brielle on both parts of the trip. Recently Ray wrote: "On a trip to Maine, we stopped to see my brother in Gilford, N.H., where I tried to reach **Bill Rose** by phone. Found it had been disconnected, so we did not stop and I have written him a note. We also stayed in Boston for two days. Anne and **Mel Jenney** were in California. **Chick Kurth**



was out of town. **Ted Steffian** was also away from home base. We did get to see Maida and **Ed Dubé**, who joined us for dinner. . . . Maxine and your Secretary took a prospective Technology freshman to hear the excellent M.I.T. Symphony Orchestra play for the M.I.T. Club of Northern New Jersey. Only complaint: Like the M.I.T. Concert Band, they just stopped at the end of their formal program, lacking the finesse which Arthur Fiedler displays in playing our *Stein Song* as a final encore. Two excuses given for this serious omission were that no orchestration exists (negated by Fiedler's numerous performances), and that it wouldn't follow Brahms (Fiedler skillfully follows anything by using it as an encore after several curtain calls). The music professionals at Technology seem to have negative attitudes toward deep-seated Institute traditions and feed their ego leading their charges to vainglorious performances of the brummagen cacaphony of Schoenburg! It was good, however, to see Betty and **Sumner Hayward**. He seems to have recovered miraculously from recent surgery. Dorothy and **Joe Wenick** were also there. Joe said their son, Martin, who is in the diplomatic service, was in Washington on a trip from Prague.

A letter we wrote to **Axel G. H. Andersen** at his last known address, 15 Westway Road, Wayland, Mass. 01778, has been returned by the post office. Anyone know his whereabouts? . . . We have written special letters to **Paul N. Anderson** and **Arthur N. Brambach** and are anxiously awaiting their replies—please fellows, now! . . . **Joseph G. Kaufman**, former President and owner of J. G. Kaufman Company, Boston appliance firm, sold his interest and retired in 1955. He and Anne make their

home at 923 Essex Road, Daytona Beach, Fla. 32017, where Joe says he has become a fishing enthusiast. He is a life member of Temple Lodge of Masons. Son David, Brandeis, Columbia and Wayne University Law School, is an attorney and certified public accountant, specializing in tax counseling in Detroit. The Kaufmans have one grandchild. . . . **Irving D. Marshall**, R.F.D., Rt. 1, Box 17, Iowa City, Iowa 52240, retired in 1953 as District Airport Engineer, Civil Aeronautics Administration. He has since carried on vocational rehabilitation work and is a member of both the National and the Iowa Rehabilitation Associations. He keeps up his flying and supplements it with photography, gardening and weekly Kiwanis meetings. Irv and Esther have two daughters and a granddaughter.

Class Agent **Ed Dubé** has sent us a welcome letter which he received from **Holland L. Robb**, 1126 Sourwood Drive, Chapel Hill, N.C. 27514—our old home state! Colonel Robb says, in part: "I have been away from my home for three months, settling the affairs of the estate of a deceased relative of my wife's and have just recently returned, which will explain my delay in answering your note. I was impressed by your taking the time to write me a personal note. My impressions of M.I.T. and my Classmates, with a few exceptions, have not led me to expect such courtesies. I was a member of the U.S. Army Group C, which was the first group of Engineer officers to be sent to a civilian institution to further their engineering education in 1920. I was already married and expecting an arrival in the family, so that my contacts with my classmates were somewhat limited to being in the classrooms or

in the drafting rooms. I regretted that I had no fraternity background or other connection to help further my acquaintance. Since leaving M.I.T. in 1921, I have joined M.I.T. groups where possible in places like Kansas City and Pittsburgh and I attended the 40th Reunion of the Class of '21 on the Connecticut coast, where we probably met. I served a total of 41 years in the military service, including four years as a cadet, and retired in 1953 as a Colonel, Corps of Engineers. I commanded two different regiments of Engineer troops and was also commanding officer of a large training camp for Engineer troops in Louisiana during World War II. I also saw service in Hawaii, later in Europe and, after the war, I was in Korea for 18 months as Engineer of the army of occupation, or liberation, as we preferred to call it. Later, I built a large air base in Japan and ended my service as officer in charge of the R.O.T.C. program at the University of Pittsburgh. I think my service was creditable but not scintillating enough to reflect much glory on M.I.T., as some of my classmates seem to have been able to have done. Since I retired, I have done quite a bit of traveling and have established a home here in Chapel Hill, N.C., which was a quiet center of culture when I first came here—but now that the word has gotten around, it threatens to become another beehive of education and a mecca for maddened retirees looking for the choice spot in which to retire. Should you be in this area, which is more or less on the way to Florida, I hope you will stop in and check up on me. With best regards to all in the Class." There are not many of the group of Army officers who were members of the Class of '21 who have continued their activities as closely as has Colonel Robb and we are most appreciative of his time and courtesy in keeping us informed in detail. We certainly hope that he and Mrs. Robb will attend all future Class functions—most particularly our coming 50th Reunion.

**Sumner Hayward** has always been one of our chief helpers behind the scenes in digging up fresh news for these columns and we're sure you'll join us in thanking, congratulating and welcoming him on his appointment as an Assistant Secretary of the Class of '21. The already heavier secretarial burden, in anticipation of our 50th Reunion, will doubtless increase further as we approach June 10 to 14 of 1971 and there will be more than enough to keep our secretarial trio busy. **Ted Steffian** is concentrating on Boston, M.I.T. and Course IV and Sumner will cover the field for the present until a nationwide Secretarial Committee is completed. . . . **David O. Woodbury**, author, lecturer, inventor—the Seer of Shore Road and the Oracle of Ogunquit. Maine 03907, has tapped the light fantastic on his writing machine as follows: "Too long have I tarried without sending you news. I'm still busy applying



A "sub-reunion" of the Class of 1921 at the M.I.T. Florida Festival in January, 1968: left to right, standing (with their wives seated in front) are Colonel William C. Ready, Edwin F. Delany, Philip R. Payson, and Henry C. Taintor.



my \$10,000 education (it would cost a lot more than that now) to writing about, rather than doing engineering and scientific projects, and lately, with certain political overtones. I'm deeply disturbed at the rapidity of our progress toward the welfare state and socialism, as I guess many of us are. Recently, I became particularly concerned about one corner of it, namely, countrywide fluoridation. This has resulted in a novel on the subject, the third of the 'Dean Riam' series, and various articles, too. I suspect few will agree with me; too many will side with the dentists that fluoridation is 'no longer debatable.' This is dangerous nonsense. No scientific subject is ever closed for debate or realignment. Today, almost 75 million Americans drink fluoridated water and less than five percent of them voted to do so. This is the definition of compulsory medication. After 20-odd years of mass fluoride imbuing, the long range effects of fluorosis are starting to appear. My guess is that we're in for an awakening, like the ones that followed the indiscriminate use of x-rays and radium. On other fronts, snow and more snow, with sub-arctic cold, and very happy life it is here, buried and at the mercy of a snowplow. My hobby nowadays is inventing a line of products called 'Silly Tools.' Anyone who wants can seek the manufacturing rights; they're for sale. I guess that's all, except to wish all of the Class a happy election year and, for goodness' sakes, consider whom you're voting for. This time it matters! Come see India and me sometime, Cac and Mac; we don't get down your way any more." Last summer, Helen and **Ray St. Laurent** visited Stanley Perham's country store at Trap Corner in the Maine village of West Paris and were surprised to find reprints of the article "Gem Man at Trap Corner," originally written by Dave for *Down East, The Magazine of Maine* and reprinted in the May, 1957, *Reader's Digest*. A rock hound himself, Dave could probably spin an equally excellent yarn on his own successful panning for gold down Maine way.

We acknowledge a detailed personal note from Betty and **Dugald C. Jackson, Jr.**, from their home at Tetrastemma, Harmony Hills, R.F.D. 2, Havre de Grace, Md. 21078. Dug says recuperating from a double hernia operation right after last Thanksgiving and the problems of housing and transportation for their children (four couples) and grandchildren (13, aged 6 to 22, with the eldest then in Germany) caused the postponement until this summer of a family party to celebrate their 50th anniversary last January 20. As Betty previously reported, they did have a big celebration with close friends and neighbors. Late in March, Betty and Dug visited their daughter and her family in Mt. Dora, Fla., for a month. While in Florida, they planned to visit **John Scott** and Wilma at their new retirement home in Daytona Beach and we hope they'll suggest to Johnalex



Samuel H. Miller, '21

that he return the personal data form and answer the letter we sent him. They'll also see Royce Kloeffer, E.E. '30, of Washington, D.C., who has a winter home in Clearwater, Fla. When Dug headed the Electrical Engineering Department at the University of Kansas, Royce was head of the E. E. Department at Kansas State and the two families became good friends. Will we see you two at alumni Day, Betty and Dug?

It is with profound sorrow that we record the passing on March 20, 1968 of the Rev. **Samuel Howard Miller** of Jewett House, 44 Francis Avenue, Cambridge, Mass. 02138, and extend to his family the sincerest sympathy of the entire Class of '21. Dean of the Harvard Divinity School since 1959, one of the country's most influential writers in pastoral theology and internationally known as an educator and ecumenist, Dr. Miller was born in Philadelphia on February 3, 1900, and prepared for Technology at Collingswood (N.J.) High School. He was associated with us in Course I. He obtained the bachelor's degree in theology from Colgate University in 1923. On the morning following his death, he was to have been honored at a reception marking the publication by Harper and Row of his latest book, entitled *Religion in a Technical Age*. Dean Miller, who was also John Lord O'Brian Professor of Divinity at Harvard, had planned to retire this summer, in the midst of tremendous progress at the Divinity School, for which he is given the major share of the credit. New programs are moving toward restructuring the curriculum "to prepare men for the actual character of their mission in a new world," in his words. One new course is directed toward students who want theological education but not to prepare for the ministry. He said of this: "One of the striking movements in the colleges today is the interest in religion by young men

who feel no call to the ministry yet wish further study. The student is exploring in many directions and religion is only one of the areas in which he finds challenge. A high percentage of the students entering today had originally chosen a profession other than that of the ministry." This harks back to our own Class of '21 and Dean Miller himself, who entered M.I.T. with us to study civil engineering, together with the Rev. **Williston Wirt**, Course XV, the late Father **Everett R. Harman**, Course IV, and the late Rev. **William F. Hastings**, Course VI. The Rockefeller family has just given \$1.5 million to construct a new dormitory and refectory at the Harvard Divinity School in memory of John D. Rockefeller, Jr., who had earlier given \$1 million to aid the school's expansion. The newspapers have enjoyed the fact that the educator who had already been named as Dean Miller's successor, Dr. Krister Stendahl is the first Lutheran to head the religious faculty at Congregationalist-founded Harvard, whose President, Dr. Nathan Pusey, is an Episcopalian. The late Dean Miller was a Baptist who headed a completely ecumenical school. Ordained in 1923, Dr. Miller became minister to churches in Belmar, Arlington and Clifton, N.J., before accepting a call to Old Cambridge Baptist Church in 1935, a post he held for 25 years. He had also been Adjunct Professor at the Andover Newton Theological School and a Lecturer and Professor of Theology at Harvard. He published numerous religious articles, he was a member of the editorial board of the *Journal of Pastoral Care*, a member of the Board of Governors of the Institute for Advanced Pastoral Studies of the Institute of Pastoral Care, a Trustee of the Northfield Schools and a member of the Professional Board of the Academy of Religion and Mental Health. He had received the honorary M. A. degree from Harvard and honorary doctoral degrees, variously D. D., Litt. D. and Ed. D., from Colgate, Arcadia, Chattanooga and Clark Universities; Denison, Grinnell and Kalamazoo Colleges; and the Chicago Theological School. He is survived by his wife, the former Myra I. Studley of Collingswood, N.J., whom he married in 1918; a daughter, Mrs. Richard C. Bryan, Radcliffe '42, of Fairhaven, Mass.; a son, F. William Miller, Denison '49, of New York City; and seven grandchildren. Two other sons, Samuel H. Miller, Jr., Harvard '43, and Albert S. Miller, Denison '45, died during military service in World War II. We are indebted to **George Chutter**, **Sumner Hayward** and **Ray St. Laurent** for aid in preparing these notes.

We all want to see you and your wife at Alumni Day and we can assure you both of a warm welcome from the friendly '21 group to add to the programmed delights of the day. Act now and be with the happy boys and girls. If you just plain can't make it for good and sufficient reasons,

submit a report of your news, your family, your travels or whatever you may wish to talk about, addressed to one of the undersigned. It can be longhand, typed or recorded on tape, as you find most convenient. But please let's hear from you, one way or t'other!—

**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J. 08730; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, Inc., 19 Temple Place, Boston, Mass. 02111; **Sumner Hayward**, Assistant Secretary, 224 Richards Road, Ridgewood, N.J. 07450

## 22

Buffalo is having a reversal in weather from the winter of 1937 to which our classmates have frequently referred. The beautiful ski slopes were reduced to "spring" conditions during the last week of March by sunny weather at 60-75° while other areas of the country had floods, storms and blizzard conditions. During early April the spring flowers came out and all snow tires disappeared. Friends returned from the South to complete their sunbathing here. We now hope to receive reports from classmates about their varied winter experiences, vacations and travels. . . . The big news from our Class President, **Parke Appel**, is his invitation to cocktails and supper at his home on Old Farm Road in Dover, Mass., on Sunday, June 9. He asks that we write or call our acceptances so that adequate preparations may be made for the afternoon and evening. His telephone number is 617-785-0072; his address is Old Farm Road, Post Office Box 137, Dover, Mass. 02030. Professor John Wulff and Eva have accepted the invitation. Since this is the year of Professor Wulff's retirement, special recognition for him will be planned. Parke also wrote regarding our 50th as follows: "On Friday, March 1, a group of 22ers met at the Faculty Club to discuss plans concerning our 50th Year Reunion and Gift. It will not be possible for us to have repeat at the Wianno Club since the Internal Revenue Service has ruled out the use of Country clubs by large non-member groups and at the same time permit the Club to have tax benefits applying to private member clubs. So arrangements have been completed for our Class to occupy the two McCormick women's houses as our Reunion Residence. There are many advantages to doing this since as Elder Statesmen we are asked to attend the Commencement Ceremonies on the Friday before Alumni Day as well as attend the activities of Alumni Day itself which would be considerable traveling back and forth if we were at a remote location. It probably will attract more classmates who have not seen M.I.T. in recent years since the Reunion expense will be held down as a consequence. This question was talked out at our meeting and it was agreed that this was the logical answer. Attending our

meeting were: Don Carpenter, Yard Chittick, Warren Ferguson, Juilan Lovejoy, Ted Miller, Win Potter, Bill Russell, Bob Tonon and yours truly. In addition, we talked over plans in respect to our 50th Reunion Gift which you will be hearing about further from **Don Carpenter**. In addition to the many ways in which a classmate may contribute to the future of M.I.T., such as through the Alumni Fund currently from year to year, or by bequest or gift directly to Tech, or participation in the Life Income Plan, we are formulating plans to encourage participation in a Class of 1922 Life Income Plan which would permit capital in modest dimensions contributed from many classmates to be merged as a common fund with life income paid to those participating. Don Carpenter is working on the details and, as I said above, you will be hearing more about this soon. The Alumni Council met on Monday evening March 25. Classmates attending were Bob Tonon, Ferg., Yard Chittick, Ted Miller, Fearing Pratt and myself. On Tuesday morning Madeline and I are flying to Chicago for a switch of planes to go on to Albuquerque, N.M. We are meeting a cousin of mine and his wife who moved there a year ago and built themselves a home after years of service with the U.S. Department of Agriculture, in which he was an expert in fibers both natural and synthetic, living in Chevy Chase, Md. They have a new air-conditioned Oldsmobile and Camper trailer. We are going to explore the wonders of the natural National Parks and monuments of Arizona, New Mexico and possibly southern Colorado. We are taking four weeks doing this and we look forward to a wonderful experience as we have never seen this section of the country. I fully expect that upon my return Tech will take me on as a guest lecturer in geology." Thank you, Parke.

**Tommy Thomson** made us happy by inviting M.I.T. to hold the next West Coast meeting near Los Angeles. He reports: "My retirement from Nash Engineering Company is set, after several extensions, for March 31. It has been an entertaining and worthwhile association. It all started in the summer of 1924 when **Dan Harvey** urged me to take a temporary job in the Sales Department while waiting for an opening in engineering. Our move to San Francisco in 1964 to open a new sales office was to be for one year. That was four years ago. These 'temporary' sales jobs have lasted a long time—almost 44 years. Next week we are moving to Corona del Mar, Calif. This is about three miles from Newport Beach and the Balboa Bay Club where we can get some sailing once again. San Francisco Bay has been too rugged for us. Newport, as you probably know, is about 50 miles south of Los Angeles, and an easy one-hour drive. If you or any of my pals in 1922 come this way, please look us up in the Orange County phone book and let us know where we can find you. **Dale Spoor** is already on

the list. We hope for others soon! Our new home is at 241 Evening Canyon Road, about one quarter of a mile from a good beach right at the entrance to Newport Harbor. We can offer swimming with surf as an added attraction. Janet lived near here some years ago. We both have quite a few friends in the area and are looking forward to the change of scene enthusiastically. We had to decide between children and grandchildren in Connecticut and in California and this time California wins. This started out to be a sort note. I can't remember, Whit, when I wrote you last and figured that I might just as well ramble on and give you a little of the background story." Thank you, Tommy, for your welcome to Southern California!

**Nathan Cherniack**, Transportation Economist of the Port of New York Authority and one of the world's pioneers in traffic research, retired in February after nearly 45 years of continuous service with the bi-state agency. He joined the Port Authority in 1923, two years after the nation's first public authority was created by agreement between the states of New York and New Jersey. The Board of Commissioners resolution noted that Mr. Cherniack's "professional attainments, integrity and untiring efforts for traffic research have set professional standards that have enhanced the Port Authority's reputation as an efficient public organization." During his career he developed original techniques for predicting traffic volume and traffic patterns which have won international recognition. His forecasts were used for the construction of the George Washington Bridge, the Outerbridge Crossing, the Goethals and Bayonne Bridges and the Lincoln Tunnel; also for the Brooklyn-Battery and Queens Midtown Tunnels. In 1963 he received the coveted Theodore M. Matson Memorial Award Citation "for outstanding contributions to the advancement of traffic engineering." He also has received the Port Authority's Distinguished Service Medal and the Howard S. Cullman Distinguished Service Medal. Mr. Cherniack is past President of the Institute of Traffic Engineers, Fellow of the American Society of Civil Engineers and a member of the American Statistical Organization and the Highway Research Board of the National Academy of Sciences. He was born in Odessa, Russia, came to this country in 1906 and was naturalized in 1915.



Nathan Cherniack, '22



Frank Travers, '23



We were proud of Buffalo's participation in the *Technology Review* for April by the publication of "New Patterns of Leadership for Tomorrow's Organization" by **Warren G. Bennis**, Provost of the State University of New York at Buffalo. . . . We are sorry to report the death of **Marion S. Dimmock** of New Britain, Conn., on February 18, 1968. The sympathy of the Class has been expressed to Mrs. Dimmock. . . . We also extend our sympathy to the family of **Earl R. Thomas**, a former Test Engineer for Consolidated-Edison Company of New York. He was the inventor of the company's "gas sniffer," a device used to detect leaks in underground lines and had been Manager of the utility's Meter and Test Department. . . . Among the new addresses received were those of **Phillip Caplain**, 10350 West Bay Harbor Drive, Miami Beach, Fla., and by **Charles E. Brokaw**, 2400 Routt Road, Denver, Colo. 80215. . . . We hope to see your smiling faces—and your wives—at Parke's house on June 9 and at M.I.T. June 10. Good health to all of you—**Whitworth Ferguson**, Secretary, 333 Ellicott Street, Buffalo, N.Y. 14203; **Oscar Horovitz**, Assistant Secretary, 33 Island Street, Boston, Mass. 02119

## 23

Last Call! By the time this issue of the *Technology Review* reaches you our 45th Reunion may be in progress at the Blue Water Resort Hotel, Bass River, Cape Cod, Mass. 02604. If not, and you plan to attend and have not registered, you are urged to make your reservations with the Hotel directly, without delay, in accordance with our last three class mailings. If you are accepted by the Hotel, you can then make out your class registration form, and pay your late registration fee and class dues to the Class Treasurer at the Hotel. The class mailings sent to you give the details relative to Class Activities at the Reunion.

**Harold C. Pearson**, President, Construction Chemicals Limited, 88 Eglinton Avenue, East Toronto 12, Ontario, Canada, reports two children and six grandchildren. On March 16, 1968, he wrote: "This is the last day of the M.I.T. Fiesta-Naches, Mexican tonight. Understand that 1923 and 1921 are working on taking in the 1969 Fiesta! Good! Conchita Lobdell Pearson and I will be with you in June. . . . **Herbert L. Hayden** has put his finger on **Earle Griswold**, **Philip L. Coleman** **Clarence Chamberlin** to serve with him on the Sports and Program Committee at the 45th Reunion; so you can be sure that there will be plenty of interesting events scheduled including movies of past reunions. . . . **Roger Cutting**, '24, Box 101, Centerville, Mass. 02632, is interested in antique and sports cars and is about to publish a book on that subject. . . . **Stephen B. Metcalfe** is retired from the N.S. Steel Corporation and reports two children and

four grandchildren. He is interested in painting, sculpture and golf. He spends most winters in Mexico, although last year he spent six months in Europe.

**William S. Wise** reports that he retired June 1, 1967, as Director of Water Resources Commission, Hartford, Conn. He is now engaged as Consultant, Charles A. Maguire and Associates, Engineers, Providence, R.I. . . . **Stephen A. Days** reports that he has retired from Stephen A. Days, Inc., Bourne, Mass. . . . **Harry Green** writes: "Looking forward to seeing you (at the Reunion)—please book me in." . . . **Joseph Nissen**, 91 Hoitt Road, Belmont, Mass. 02178, is Science Teacher at Rindge Technical High School, Cambridge, Mass. . . . The retirement of **Frank J. Travers**, as Financial Vice President of American United Life Insurance Company was noted in the May issue; he is past President of the Indiana Association of Massachusetts Institute of Technology Alumni and was Honorary Secretary for M.I.T. alumni in the Indianapolis area. In the life insurance investment field since 1929, Travers joined American United Life 20 years ago. He was elected a Company Director in 1953. Travers was chairman of numerous life insurance industry investment committees. He was a lecturer at Notre Dame and Britter Universities and the Wharton School of Finance. On several occasions, Travers testified as an expert on the cost of money before the Indiana Public Service Commission.

**Ronald D. Brown**, retired from New England Telegraph and Telephone after 40 years service. Presently he is Clerk of the Corporation and Trustee of the Lexington Savings Bank. . . . **Charles V. Reeves** reports: "Rather inactive, having been retired for physical disability from the United States Air Force." . . . **Edward J. Healy**, Vice President of the Kuljian Corporation, Engineers and Constructors, 1200 North Broad Street, Philadelphia, Pa., reports an increase from four to five grandchildren. . . . **Robert T. Colburn**, former Vice President of Charles T. Main, Inc., reports that he has retired. . . . **Jonathan Y. Ballard** is Vice President of the Southland Corporation, Box 1121, Fort Worth, Texas. . . . **O. W. Lowry** reports two children and nine grandchildren, and is working up projects for when he retires on April 1, 1968 (as President, Sligh-Lowry Furniture Company, Holland, Mich. 49423). His home address is 686 North Shore Drive, Holland, Mich. . . . **Theodore M. Edison**, 222 Main Street, West Orange, N.J. 07052, reports special interest in population problems, nature preservation, impact of technology on our environment, social relations and economics. There is a very interesting statement by Theodore in the *National Parks* magazine for May, 1967, entitled "The Great Swamp of New Jersey: Jetports and 'Progress.'" In February the Fish and Wildlife Service held a public hearing on its plans for Wilderness in the Great

Swamp Refuge. The above mentioned statement was submitted by Ted for the hearing record on that occasion. He asks some disturbing questions about a philosophy which the conservationist Darwin Lambert has called "the perpetual growth mania."

**Hugh D. Chase** reports that he is retired. . . . **Donald W. Height** is retired and reports one child and one grandchild. . . . The Newark *Sunday News*, March 10, 1968, announced that **James M. Robbins** of Maplewood, N.J., had been named a Distinguished Professor at Newark College of Engineering. . . . **Marvin Eickenroht** reports: "I had to undergo an abdominal operation for a color malignancy a little over three weeks ago and am now not sure I can attend the Reunion, regretfully, but will try." . . . **Leslie W. Powers** reports that he has retired. . . . **E. Louis Greenblatt** reports: "Enjoying a beautiful tour through Switzerland. The scenery and friendly people here are tops. Kindest regards and hope to see you in June." . . . **M. L. Flickinger** reports that he retired and is satisfied. He has two children and six grandchildren and is interested in golf, travel and "doing things around the house." . . . As of April 10 the following classmates had indicated to your Secretary that they were "definitely" going to attend the 45th Reunion: **Herbert S. LaLonde**, **Thomas B. Drew**, **Howard A. Lockhart**, **David W. Skinner**, **Rodney M. Goetchius**, **Norman Leo Weiss**, **Walter Dietz**, **Peter V. Martin**, **Earle A. Griswold**, **Charles A. Ducote**, **Charles R. Goldstein**, **John W. Sands**, **Joseph Fleischer**, **Rosco A. Smith**, **Edward S. Averell**, **Julius A. Stratton**, **Richard A. Frazier**, **John W. Beretta**, **C. V. Chamberlain**, **Horatio L. Bond**, **Arthur N. Davenport**, **Bertrand A. McKittrick**, **A. Raymond Holden**, **Jonathan Y. Ballard**, **Richard C. Kleinberger**, **James A. Pennypacker**, **John Zimmerman**, **Harold C. Pearson**, **Stephen A. Days**, **Forrest F. Lange**, **Elliot P. Knight**, **E. Louis Greenblatt** and **M. L. Flickinger**. Although the "definitely" and "tentatively" going to attend lists are not complete, they will give you some idea of who will be there at Bass River in June. The following classmates had indicated that they were "tentatively" planning to attend the 45th Reunion: **Alcott L. Hooper**, **Frank J. Travers**, **V. A. Whitaker**, **Hugh S. Ferguson**, **Raymond M. Meekins**, **Isadore Robbins**, **Sherwood Berger**, **Walter E. Richards**, **O. W. Lowry**, **Benjamin P. Lane**, **Dorothy W. Weeks**, **Columbus E. Lord**, **Theodore M. Edison**, **Roger Cutting**, **Atherton Thomas**, **William S. Wise**, **Joseph K. Preston** and **Marvin Eickenroht**. Notice has been received of the deaths of the following classmates but no further details are available at this time: **John P. Nissen, Jr.**, Box 153 Church Road, Wyncote, Pa., died on March 11, 1967; **Lawrence E. Duane**, 23 Columbus Avenue, Beverly, Mass. 01915 (no date given); **Merrill W. Hammond** died on March 4, 1968. . . . The following are changes of address; **Harold C. Pearson**, Construction Chemicals Limited, 88 Eglinton Avenue,



East, Totonto 12, Ontario, Canada;  
**Cecil A. Green**, P. O. Box 5474, Dallas,  
 Texas 75222; **George B. McReynolds**  
 6898 Casitas Pass Road, Carpinteria,  
 Calif. 93013; **Michael F. Yarotshy**,  
 1838 North West 42d Street, Oklahoma  
 City, Okla. 73118; **Marvin Eickenroht**,  
 128 Grant Street, San Antonio, Texas  
 78209; **Leslie W. Powers** 11959 84th  
 Avenue North, Largo, Fla.  
 33540; and **O. W. Lowry**, 686 North  
 Shore Drive, Holland, Mich. 49423. . . .  
 Please notify your Secretary at once  
 if you know the present address of  
 any of the following classmates: Arthur  
 A. Earle, James W. Pratt, Albert Cabrer  
 and George H. Ludlow.—**Forrest F.**  
**Lange**, Secretary, 1196 Woodbury  
 Avenue, Portsmouth, N.H. 03801; **Ber-**  
**trand A. McKittrick**, Assistant Secretary,  
 78 Fletcher Street, Lowell, Mass.  
 01852

## 24

Sounds as though the annual M.I.T.  
 Fiesta in Mexico City was a big success  
 as usual. A note from **Max Ilfeld** and  
 Bertha said: "Marvelous time, on the go  
 for three days and nights. About a hun-  
 dred attended, with **Nish Cornish** the ram-  
 rod. Much tequila disappeared down Yan-  
 kee gullets." We were well represented  
 by **Clarke Williams** and Maggie, Nish  
 Cornish and Luisa, the **Ru Torres**, the  
 Ilfelds, and this is a bit cryptic, "Young  
 and Ke Sung (3)." Is this **Joe Young**,  
 one-time coxswain of crew? Seems  
 logical, since Joe's now retired and  
 living in Mississippi, but we haven't heard  
 of him in years, not since he was build-  
 ing railroads in China long, long ago.  
 And what does the "(3)" mean? The  
 Ilfelds, by the way, were wintering in  
 Guadalajara. No doubt by this time  
 they have returned to the rugged climate  
 of Albuquerque. . . . Evidently the Car-  
 dinals can't take winter weather either.  
 Returning from a Caribbean cruise  
 in February, they both came down  
 with lengthy colds. They were very  
 pleased, therefore, to accept a neigh-  
 bor's invitation to come to Florida for a  
 week or more, then drive his car  
 back "at your leisure, via Chicago or  
 any other place." This neighbor's  
 previous experience, by the way, may  
 serve as a warning to others. Last  
 fall he paid an outfit \$90 to drive his car  
 down while they went by air. It was  
 delivered a month later by "a hippy and  
 mate" with all his belongings stolen.  
 So if you're contemplating any such deal  
 yourself, better think twice and then  
 get in touch with Cardinal's Car Delivery  
 Service. Considering the number and  
 widespread geographical distribu-  
 tion of Cardinal progeny, there are prob-  
 ably operatives all over the country.

**Ed Saibel** has both an S.B. and a Ph.D.  
 in mathematics from M.I.T. He is now a  
 Professor at Carnegie-Mellon Univer-  
 sity, and is engaged in a study which  
 could have far-reaching effects on  
 automobile safety. Under a federal grant,  
 he is conducting an investigation  
 of vehicle skidding for the Office of

Vehicle Systems Research. Stemming  
 from a study on the stability of vehicle  
 steering he made in 1962, this one  
 will include skidding under all conditions,  
 from icy roads to tire blowouts. And  
 here is the intriguing part, no test  
 vehicles are being used. Rather, Ed is  
 converting the equations of motion and  
 the knowledge of auto characteristics  
 into mathematical terms for computer  
 use. Another example of the role  
 of computers in your future. . . . **Roland**  
**Black** retired from the New York Tele-  
 phone Company four years ago. When he  
 is not traveling to the Far West or  
 Europe, he finds himself completely  
 busy with church and civic affairs, with  
 enough time left over for home put-  
 tering and gardening. His specialty in  
 the Green Thumb Division seems to be  
 pole beans. . . . After 40 years, **Blanchard**  
**D. Warren** retired from Bird Machine  
 Company. For some time Nicky had  
 been Pacific Sales Manager. Now he  
 is active in the pulp and paper industry  
 as a Manufacturers' Representative,  
 with time out for a European trip  
 this summer. . . . **William Ross** did not  
 stay with us to graduate, but will  
 be remembered by some as a stalwart on  
 our freshman tug-of-war team. Cam has  
 been with Dewey and Almy for many  
 years, their expert on balloons, among  
 other things. Although retired in 1966,  
 he is still retained as a Consultant. . . .  
 As June rolls around again, so does  
 Alumni Day. It's on Monday, June  
 10, this year. Hope to see many of you  
 there for some of the festivities.—  
**Henry B. Kane**, Secretary, Lincoln Road,  
 Lincoln Center, Mass. 01773

## 25

A letter from **Roger Ward** is so interest-  
 ing that I think every classmate should  
 be interested in hearing directly from  
 Roger, so the letter is quoted in full:  
 "After all these years, perhaps I should  
 report in, just to prove that Georgia  
 Tech has no monopoly on ramblin'  
 wrecks. I left the Senior Prom to head for  
 a drafting board at the Curtiss Aeroplane  
 and Motor Company in Garden City, L.I.  
 Thanks to the Lindberg and Bull Market  
 aviation boom, by 1928 I was Chief  
 Production Project Engineer at their  
 reactivated Buffalo plant. Unhappy with  
 the snow and other local irritants, in  
 1929 I moved to Pitcairn Aircraft out-  
 side Philadelphia and helped nurse the  
 Autogiro through its rather short life."

"My next objective was Glenn Martin in  
 Baltimore where I helped lay the founda-  
 tion for their pre-war expansion as As-  
 sistant to the Vice President in charge of  
 Manufacturing and later Emergency Plant  
 Facilities Administrator. After Pearl  
 Harbor, having an urge to share in the  
 excitement, I convinced Martin to let  
 me set up their London office. Upon  
 establishment of the Ninth Air Force in  
 the E.T.O. I was fitted for a uniform (I  
 had resigned my reserve commission in  
 '34) and acquired the peculiar status of  
 assimilated Lieutenant Colonel attached  
 to Bomber Command."

"On the constructive side, we handled  
 battle damage repair and engineered  
 the installation of trick British blind  
 bombing equipment enabling B-26  
 operations during the foul weather of the  
 pre-invasion winter and spring. On the  
 less positive side, I got bombed out  
 twice, survived one plane crack-up and  
 an unintentional auto trip 20 miles behind  
 the German lines. Having shown Patton's  
 Third Army the way, I returned to  
 Baltimore as Chief of Martin's Research  
 Laboratories. Next stop was McDonnell  
 Aircraft in St. Louis where a rosy future  
 was overshadowed by my dislike  
 of the Midwest. So I bought a motel in  
 Ventura, Calif., but boredom soon  
 propelled me into a job with Boeing as  
 their Latin American Representative  
 (having never been south of the Rio  
 Grande). For two years I dropped my  
 suitcase in the best and sometimes the  
 worst hotels in every country in South  
 America, except Paraguay. During this  
 period of high adventure I was bitten  
 by the pioneering bug, bought 1000  
 acres of virgin hardwood plateau in the  
 headwater of the Amazon expecting to  
 make a fortune out of rosewood. After a  
 unique year I realized I would either  
 go broke or go native, so I picked up  
 my few marbles and returned to Boeing  
 as Liaison Engineer, selling the idea of a  
 jet bomber to General LeMay and  
 his strategic Air Command. This was  
 a particularly challenging task since  
 LeMay, at the time, was trying to quit  
 smoking his traditional cigars. After  
 the B-47 (fore-runner to the B-52)  
 was in like Flynn there was talk of Boe-  
 ing sales representation in the Far  
 East. Inconsistently, I chose instead to  
 move to Sao Paulo, Brazil, and establish  
 an importing and exporting business,  
 which did alright until Brazil's foreign  
 exchange situation became impossible.  
 So I returned to the States."

"Having never done any retail selling,  
 I surveyed the field and started a G.E.  
 and Goodyear dealership in Pensacola,  
 Fla. My first day's receipts were 56 cents!  
 The second year, however, thanks to  
 the simultaneous hatching of the huge  
 Chemstrand Nylon plant and two TV  
 stations, my income tax became the  
 number one problem. A problem I  
 solved completely by selling the business  
 and taking up free lance writing. In '56,  
 the rocket activity at Cape Kennedy  
 (née Canaveral) loomed irresistibly. I  
 moved down there, designed and built a  
 small shop, bought the equipment for  
 a self-contained graphic arts and offset  
 printing shop and a new cycle began.  
 Thanks to a Navy handbook on ship-  
 board lithography, generous local advice  
 and six months of long hours and hard  
 work I was in business as a subcon-  
 tractor to the aerospace industry  
 chewing up paper by the truckload. Come  
 '62 I had to choose between tripling  
 the size of the plant or turning down  
 business so I sold out to a younger, more  
 ambitious body. By this time the Florida  
 real estate brokers were making me  
 land poor, and since I couldn't seem to  
 lick them I joined them and have been  
 in the real estate business ever since—

except for the two years when I managed the Industrial Air Center for the City of Melbourne (Florida not Australia). Now for the commercial: Despite the fact that I foresook Hudson's Manual and three moment equations for a crazy-quilt existence back in '27, I owe a great deal to the Institute. Had I not been taught to think and apply the logic of tested solutions to new and unrelated problems, the scaling of strange walls would have defeated me. I would have quit rambling and think of the fun I would have missed!" Roger's present address is 530 Biscayne Boulevard, Miami, Fla. 33132. . . . Letters such as this one from Roger make your Secretary feel that it is really worthwhile serving in this office, and getting first-hand information from classmates. I am sure those on the reading end of this column appreciate hearing from other members of the Class. Unfortunately, too few of the Class keep us well informed as to their activities, and this is another pitch for more communications!

A letter from **John Black** resulted from questions raised by your Secretary in two consecutive issues of the *Review*, and John notes that since graduation he has been in various kinds of manufacturing, mostly in the office machines industry. Early in 1965, he was Chief Engineer at the Bristol, Va., Plant of Munroe International Corporation, a Division of Litton Industries. The company also had manufacturing plants in Europe; and in February of 1965, John was transferred to the main office at Orange, N.J., as a Manufacturing Consultant and is still in that capacity. Since that time, he has made several short trips to Europe and Mexico, and in April of 1966 went to Rome to assist a Litton Plant there to get started in the manufacture of business machines. Between April, 1966, and October, 1967, he had several sojourns in Rome and now has an ambition to write a book about the restaurants there and to become the Duncan Hines of Rome. He is due to retire November 1 of this year and expects to move back to Bristol, Tenn., at that time. . . . A letter from **Ed Booth** indicates that he retired last February but he will continue as a Director of the Lennox Industries, Inc., with an office at the Lennox-Marshalltown Iowa plant while directing the activities of the Norris Foundation and an affiliated investment company known as the Armstrong-Ohio Corporation. Ed's career with Lennox started back in 1935 when he became Credit Manager of Lennox-Syracuse, a position which he held until moving to Marshalltown five years later. In 1949, he became Secretary-Treasurer of the Lennox Corporation.

**A. L. Samuel** published in the *I.B.M. Journal*, a few months ago, an article entitled "Some Studies in Machine Learning Using the Game of Checkers." . . . A note from the Alumni Office indicates that **Calvin A. Campbell** retired from the Board of Directors of the Dow Chemical Company and from his position as General Counsel of the company in De-

cember of 1967; and a few weeks ago in the Boston *Herald-Traveler* it was noted that **Maurice Freeman** is now Chairman of the Board of Loomis-Sayles Company. . . . From the Office of the *Technology Review* comes the information that **Finlay G. Cameron** retired in September of 1967 as the Lincoln, Ill., area Vice President of the Central Illinois Electric and Gas Company Division of Commonwealth Edison Company with which he had been associated since 1937. Soon after retirement, he left for Saigon, South Vietnam, where he is now serving as General Manager of the Saigon Power Company. His work there is related to the U.S. Government's program under the Agency for International Development. He is responsible for the development and coordination of all electric power supply facilities in war-ravaged South Vietnam; and he reported to friends in Illinois that he had come safely through the recent fighting in Saigon. His present address is: **F. G. Cameron**, USAID/ENG/SPC, APO San Francisco, Calif. 96243.—**F. L. Foster**, Secretary, Room E19-702, M.I.T., Cambridge, Mass. 02139

## 26

This is Easter Sunday at Pigeon Cove. We are writing in the study and between sentences as we look up the Class of '26 silver tray bearing all of your names comes into view. Yesterday's mail brought the sad news that three of the names on the tray are no longer with us. **Earle Lissner** died just two weeks ago, **Herman Olander** a week before that and **Monsignor Arikur Riley** last December. Earl was a faithful attendant to Class functions and as a world traveler always wrote us from far corners. "Ole" Olander informed us at our last reunion that he had retired and was thoroughly enjoying it. Monsignor Riley was a classmate we had never met since his M.I.T. chemical engineering sojourn was relatively short enroute to the priesthood. He was keenly interested in the Class and a faithful correspondent. On this Easter Sunday we extend the sympathy of the Class of '26 to the families of these devoted members of our Class. . . . A couple of months ago we told you of the difficulty experienced in finding the name of **Gilbert Delvaile**. The Alumni Office and your Secretary ended up apologizing to each other but now after reading our story Gilbert has come through with the real explanation. We quote from his recent letter. "Dear George: I am very sorry indeed that my name gave you all this trouble. What has happened is that my name was a victim of automation. California Electric adopted an I.B.M. system way back in the 30's. Now in those days, the tabulators had a limited capacity, and Gilbert Caro Delvaile was way beyond that capacity so that the company shortened it to G. C. Delvaile. I did not complain too much. At that time, I had charge of rates, including the nastier complaints about bills and rates, and as a result, I was also known as

"that damned Frenchman in Riverside." So you see my full name could have been changed to something worse. By now I have almost forgotten what my full name really is. Again, my apologies, and thanks a lot for making it possible to get in touch with my two friends. Sincerely, G. C. Devaille."

We still find the notes that come back to us on the back of the Alumni Fund return-envelopes most useful, particularly this month when we want to keep them short. We have four **Ray Holgate**, 2374 Greenwich Street, San Francisco, is brief and to the point: "Retired as of February, 1968. . . . Dav McGrew says: 'Have completely retired and am enjoying loafing. Have bought a home here in Fayetteville, N.C. Major General **E. J. McGrew, Jr.**' . . . And **Flint Taylor** comes on the scene (postmarked from Delray Beach): "As with many of our generation six months at our home in Delray Beach, Fla., and the rest in Wellesley Hills and Cape Cod. I go to the office while in Boston three days a week. Let us hope generations to come may make this world less unsettled." . . . Now the fourth and last one really shook me particularly when I look for the postmark and find it was written about 10 days before his death reported above. **Earl DeWitt Lissner** last report to us stated: "Paraphrasing Clemens, Mark Twain, on the report of his death, 'The alumni listing Retired is greatly exaggerated. Same company, same job, tired but not retired.' " . . . This is not an issue for us to ramble on with Pigeon Cove folklore but before our usual cherrio we remind you that Monday, June 10, is Alumni Day and we sincerely hope that you will make it. See you then!—**George W. Smith**, Pigeon Cove, Mass. 01966

## 27

**George B. Darling**, Professor of Human Ecology at the Yale School of Medicine, has become the first American to receive the Supreme Award of the Japan Medical Association. George, on leave from Yale for the past 10 years, is Director of the Atomic Bomb Casualty Commission in Hiroshima, which has been conducting long-term studies of Hiroshima and Nagasaki populations to identify latent biological effects of the bombs. He received the award for "out-standing services to the promotion of cooperation in the field of medical science between the United States and Japan." The A.B.C.C. is operated by the National Academy of Sciences in cooperation with the Japanese government; the Yale Medical School is responsible for staffing the medical program. Certainly our congratulations go to George for his important work, and this distinguished award.

**Vernon G. MacKenzie** spoke recently at a Western Electric seminar on "Engineering's Role in Environmental



Control," particularly emphasizing the need to develop trained people to staff the government's anti-pollution programs. He is now Assistant Surgeon General and Deputy Chief of the Bureau of Disease Prevention and Environmental Control, U.S. Public Health Service. . . . **Bud Fisher** represented M.I.T. at the inauguration of Martha Peterson as President of Barnard College in April. . . . **Jim Buckley**, who retired from Du Pont a year ago, is now at 266 Cropwell Drive, Maple Shade, N.J. 08052. . . . Pictures—it is very important that the files should contain yours. Please send one especially if you are sending news of yourself.—**Joseph S. Harris**, Secretary, Box 654 Masons Island, Mystic, Conn. 06355

## 28

With deepest sorrow we report the death of **Arthur Nichols**, long prominent in class affairs. Art had been seriously ill for the past two years but continued to take an active part in his business in Waltham, Mass., and in his many philanthropic and civic interests. He attended several meetings while our Steering Committee planned our 40th Reunion. He was born in Waltham, graduated from Phillips Exeter Academy and from M.I.T. in our Class. He joined the family firm, W. H. Nichols Company, machine manufacturers, in 1930. At the time of his death he was President of the firm. Art was a former Chairman of the American Society of Tool Engineers; Chairman of the Board of the Waltham Federal Loan Association; a Trustee of Northeastern University; an Officer of the Waltham Hospital; and he headed many charities in Waltham. He leaves his wife, Mary W. (Conger); a son, A. Laham of Weston; two daughters, Mrs. George P. Fog, 3d, of Chestnut Hill, Mass., and Mrs. Rodrige Botere of Bogota, Columbia; and two sisters, Mrs. Frances Hoaglund of Sudbury, Mass., and Mrs. Barbara Winslow of Potomac, Md.; and four grandchildren. We attended the memorial service at Christ Episcopal Church in Waltham on April 4 with several other classmates, including **Jim Donovan**, who was accompanied by Frances, Florence Joje, **Dave Olken**, **Ed Poitras**, and others.

We note from a carbon of a letter sent to Technology Store that **George Palo** of Knoxville, Tenn., was to be fitted with academic regalia to properly represent the Institute at the inauguration of the President of Knoxville College on March 16. For enlightenment of the Class please note that George is six feet tall, weighs 175 pounds and wears a size 7½ hat. . . . During a recent trip through St. Petersburg, Fla., we visited with our old Course I classmate, **Hy Weinberg**, who now lives in Passe-A-Grille, which is only a few miles south of St. Petersburg Beach. Hy retired as a Colonel in the Army in

1956 after a career that took him to many parts of the world before, during and after World War II. While stationed in France during the early fifties and while associated with N.A.T.O. in some capacity, he met and married wife Valerie, who was Administrative Secretary to General James Gavin. Val is a very interesting, gay and brilliant woman of Swiss-Italian birth, who had many interesting stories of her association with American officialdom in France. Hy recounted many details of his army work both in the U.S. and Europe and during his tours of duty in India, Japan and China. He had spent about two years in each of these regions during and immediately following World War II. Our impression was that they had both had about enough of Florida, after a 10-year sojourn, and were planning a move to either Colorado or southern California; but by the time you read these notes you probably will have heard some of the stories, because both Val and Hy hoped to attend our early June Reunion.

From the *Magazine of Standards* we note that **Al Gracia**, Vice President for Research for the Goodyear Tire and Rubber Company, was elected a Director of the U.S.A. Standards Institute. . . . We also note from a news clipping dated March 18 of this year that **Bill Hall** has been appointed Director of Development Engineering on the staff of the Vice President of Engineering for the Raytheon Company. His duties will include supervision of company-wide independent development programs and coordination of company technical capabilities. Bill has been with Raytheon 27 years and was the first company scientist to be designated a Consulting Scientist, the highest scientific engineering level attainable at Raytheon. Only 15 of the 4,000 engineers and scientists of the company have achieved this level. . . . **Leon Gaucher**, we note, in the symposium of the "World of 2067" submitted a paper "Energy: Key To the Future." Leon is Assistant to the Manager of Scientific Planning, Research and Technical Department of Texaco, Inc. . . . **Merrill R. Fenske**, who received his doctorate with our Class and now is Head of the Chemical Engineering Department and Director of the Petroleum Refining Laboratory of Pennsylvania State University, has been elected 1968 Chairman of the American Chemical Society's Division of Industrial and Engineering Chemistry.

A letter from **Al Daytz** happily tells us that he plans to be at the Reunion and reports that he is now living at 8725 Clifton Way, Beverly Hills, Calif. 90211. His letter continues: "I notice that Alumni Day is June 10. Dorothy and I were married on June 10, 1928, and will be celebrating our 40th wedding anniversary at the same time as our 40th Reunion. My daughter, Lois Lorraine, was born on December 8, 1929, and I claim she was the first child born to any member of the Class

who was not married at the time of our graduation. She is now married and has two children of her own. I also have a son, Robert, who teaches for the Ontario School District and has two children. For nearly 20 years I have been a Senior Structural Engineer for the Office of Architecture and Construction for the State of California. For three years I lectured at the University of Southern California (evenings) to graduate students on 'Plastic Design in Steel.' Before coming out to California I taught structural engineering for 13 years at Northeastern University. I still keep myself in pretty good physical condition, working out regularly at the Beverly Hills Health Club. When I retire in '69, I intend to keep active, physically and mentally."—**Hermion S. Swartz**, Construction Publishing Company, Inc., 27 Muzzey Street, Lexington, Mass. 02173

## 29

Would you believe—we have no news from any of our classmates this month. Even **Wally Gale**, our most dependable reporter, said he had no news. However, thought you would be interested in the following. We checked our card file of all members of the Class of 1929 and find that 213 members have made the class news at least once since we sent out the questionnaires in 1964. Then we have a group who seemingly had extra good publicity agents as their names appeared several times in class notes—39 were in twice, 10 were included three times, two five times, and one very popular 29'er whose activities were reported six times. *But*, we have cards for 402 class members of whom we have had no news either directly or indirectly. So, if your name hasn't yet appeared in these class notes, would very much appreciate a brief note of your most recent activities and accomplishments. Don't be discouraged if your name has already appeared, we still want your up-to-date news, too! Looking forward to seeing many of you at Alumni Day, June 10. Best regards—**John Rich**, P.O. Box 503, Nashua, N.H. 03060.

## 30

As forecast in last month's notes, Marion and I attended the 20th annual fiesta of the M.I.T. Club of Mexico City and found it an altogether delightful experience. The club members had arranged a most interesting and varied 3-day program, including an evening at the ancient Toltec city of Teotihuacan where we witnessed a spectacular "Sound and Light" display in a setting flanked by two huge pyramids. For this event the club had thoughtfully provided a clear evening, a gentle breeze and a full moon as a backdrop. The final event was a *Noche Mexicana* hosted by Luisa and Nish Cornish ('24) in the garden of their



charming suburban villa where the program included a series of enchanting regional dances in costume by some of the younger club members and their lovely ladies. Attendance at one of these fiestas is certainly something that you should include in your future travel plans. I must resist the strong temptation to give further details about the fiesta for fear of duplicating a report that may appear elsewhere in this issue, but there was one class-related event that can perhaps be properly reported here. On the second evening of the fiesta we visited the School of Architecture of the University of Mexico where we heard a most interesting talk by Lawrence Anderson, '30, who, as many of you know, heads the M.I.T. Department of Architecture and Urban Design. Using Teotihuacan, which we had visited the previous evening, and other Olmec cities as illustrations, Professor Anderson suggested that there are certain lessons in urban design to be derived from these cities, notably the extensive use of open space at the core of the city to meet the various social needs of the people. He then went on to describe several modern examples of Mexican urban design which were apparently influenced by the spatial concepts of the ancient cities. These were contrasted with several U.S. urban renewal projects which had demonstrably failed to achieve the desired objective. It was suggested that the inability of the U.S. projects to operate successfully might be due to the failure of the designers to take into account the complete social needs of the people.

An increasing number of our classmates appear to be retiring early; four of the five reports received this month are from retirees. **Maurice Mayer**, who was with Esso Research and Engineering, has selected Houston, Texas, as a retirement location and is "busy getting settled" there and "handling real estate and other properties in Lake Charles, La." The Mayer's two children graduated from Vanderbilt. Daughter Florence is married to a lawyer and lives in Chicago. Son John received a J.D. at the University of Chicago and is a Captain in the Air Force J.A.G., stationed at Paine Field, Wash. . . . **Warren Martell's** retirement home is Long Beach, Calif., where he is President of the Interfraternity Alumni Association of Southern California, the first M.I.T. man to hold this job. He is also a member of the L.A. area M.I.T. Alumni Fund Council. . . . **Dutch Hamilton** retired from Tupman Thurlow Company, Inc., as of last September and moved to New Mexico. The Hamiltons have purchased a home there and agree with the state slogan that New Mexico is "The Land of Enchantment." . . . **W. Clifton McLendon**, formerly with Consolidated Papers, Inc., Wisconsin Rapids, Wisc., has retired to Winter Park, Fla., where he is active in the University Club which includes some 20 M.I.T. men among its members. . . . Eleanor and Hijo Marean

are continuing their real estate and insurance brokerage business as "The Mareans." Hijo is a member of the Greater Salem Board of Realtors and the Boston Yacht Club. . . . Change of address: **George F. Wyman**, 1007 Bunker Hill Road, Ashtabula, Ohio 44004.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

## 32

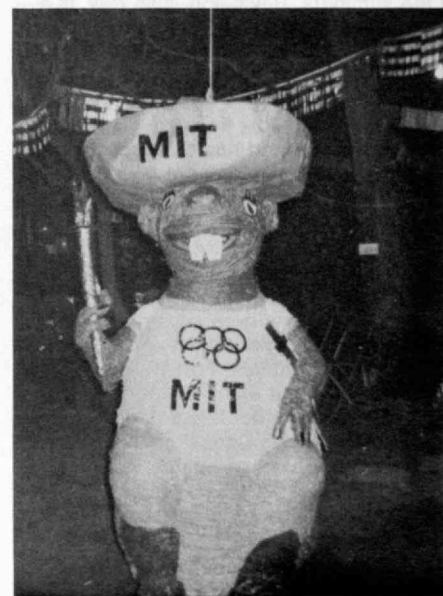
We are proud to report that **Albert G. H. Dietz** has been named the recipient of the "New England Award" for 1968. This award is given by the Engineering Societies of New England to a New England engineer whose accomplishments and character merit recognition by his fellow engineers. . . . **Irving I. Schell**, Course VIII, as the Director of the Ocean-Atmosphere Research Institute, becomes principal investigator of a project for research on the inertial characteristics of the ocean-atmosphere circulation and its application to long-range forecasting through a grant from the National Science Foundation. . . . Our traveling correspondent, **James E. Harper**, Colonel U.S.A. Ret., has sent another welcome letter following a trip. He writes of himself: "I am back with the Army since last fall. Not in uniform again but as a general engineer in the Civil Service engaged in the engineering aspects of military equipment standardization and product improvement within the Department of Defense." While attending the Regional M.I.T. Conference for the Delaware Valley in Philadelphia with his wife, Jim made contact with **Addison S. Ellis**, Course XV, who was a fraternity brother of Jim's. Ad has been with Smith, Kline and French for 36 years and is now Vice President of Corporate Administration for the drug manufacturing firm. Ad and Miriam have three girls, one employed at Random House, one working in Philadelphia and the third a student at Wellesley. Jim also phoned **Axel Bergholm**, Course I, who was formerly with General Electric and now retired to do-it-yourself jobs like repairing his kitchen range which Jim's call interrupted. Axel has a son with Bell Labs at Holmdell, N.J. The only other '32 representative Jim saw at the conference was **Ted Meyer**, Course XV, who is President of his own pest control firm, Theodore Meyer, Inc., with headquarters in Philadelphia and branches in Wilmington, Del., and Washington, D.C. Ted's four children are: one son with Army in Germany, a Specialist 4th in Army Finance, who will be out of the service in May; one married son with I.B.M. in Kingston, N.Y., after having studied business administration and computer science; a third son a sophomore at Temple University; and an only daughter at home. Jim Harper has been diligently seeking out information that has proven of interest to the Class for so many years that we should do our bit to assist his effort. You might give him

a call whenever you are in Washington. Jim's address is 2700 South Grant Street, Arlington, Va. 22202.—**Elwood W. Schafer**, Secretary, M.I.T., Room 13-2145, Cambridge, Mass. 02139

## 33

In spite of having announced that there would be no more travel talks, we would like to mention the Mexico City M.I.T. Club Fiesta. Leona will not fly, so I went to Mexico by myself. I took an afternoon flight from Miami, a three hour ride to a very definite *paraiso*. My purpose in mentioning the Fiesta is to make known to you that it is one of the top notch events of the M.I.T. year. The committee started us off with a short historical tour and then set up the annual luncheon at the University Club. At this time Clarence Cornish, '24, introduced visiting notables, and Armando Santacruz-Baca, '54, handled the more formal details. At 5 p.m. we left for the Pyramids of the Sun and Moon at Teotihuacan for the after-dark performance of "Sound and Light." The next day we visited a typical small town's local industries—glass and ceramics—and had lunch at the now famous Cortijo de la Morena where the guests are bull fighters. The evening brought a lecture by Dr. Lawrence Anderson, '30, Head of the M.I.T. Department of Architecture.

The third and last day we visited a series of colonial homes, then spent an evening at a modern home—that of Nish and Luisa Cornish ('24). Here we enjoyed the *Noche Mexicana* in their large and beautiful garden. The feature attraction was a large papier mache M.I.T. Beaver suspended on ropes above the garden which was lowered



A feature attraction at the *Noche Mexicana* which was held at the home of Clarence and Luisa Cornish ('24) was the large M.I.T. Beaver constructed of papier mache. It was used to decorate the Cornish garden during the 20th Annual Fiesta of the M.I.T. Club of Mexico City.

for inspection after the guests were assembled. This figure was about seven-feet high. The various Mexican foods were prepared on braziers by expert native cooks and were delicious. We were entertained by a three-piece Marimba Band and were served exotic drinks. The M.I.T. Club wives, in dashing costumes, entertained us with their dancing. I cannot urge you half enough to mark your calendars for next January and plan to attend this remarkable event.

**Ray Sohn** is Management Consultant to manufacturers and R. and D. firms on behalf of the U.S. government. He gives free financial and technical advice to small businesses. Ray's son Bernard is Manager of Technical Information at the R. and D. firm of Millipore Corporation, Bedford, Mass., and has three children. Ray's daughter Charlotte is married to Neville Lefcoe, Professor of Medicine and Lung Cancer Research at Victoria Hospital, London, Ontario, and has four children. His daughter Marian is married to Irving Rosenberg, a life insurance agent, and they have two children. His daughter Rosalie is married to electronics specialist Milton Fishman. Nancy, a recent honors graduate of Northeastern University, is married to Peter Swartz, a biochemist at Ionics Corporation, Waltham, Mass. Nancy is teaching at Smith School in Wellesley, Mass. Ray's hobbies are golf, the stock market and business scientific research. . . . **Ray Theriault** from Buttonwood, Pa., writes: "After 34 years with the Budd Company, I have elected early retirement but plan to stay active in consulting work, primarily in the mass transportation field since most of my experience is in the railway end of Budd." Ray goes on to say that this consulting might well take him into most of the large U.S. cities. He and Ruth will continue to enjoy Ocean City, N.J., in the summers. Ray's son, also Ray, is a junior at Cornell.

**John Howell** will be at the Reunion. His daughter Debbie is to be married in May. John has just finished 1½ years consulting and has developed two inventions, both of which are now in the patent stage. He has joined Grant Pulleys and Hardware as an R. and D. Engineer. The Grant location is only five miles from New City, N.Y., where he lives. . . . **Fred Reustel** joins the late Mr. Clemens in denying, emphatically, the story of his demise. Fred has been with City Utilities, Fort Wayne, since 1952. He had eight years as General Superintendent, and is now starting his ninth as Consultant on utility matters, rates and union relations. Kay has been working with the school lunch program. They will have four children through college by next summer. Two of them will have their doctorates; the elder got his bachelor's and master's at M.I.T. then went on for his Ph.D. at Princeton. Fred is quite frank about the story of his demise, and allows that it was not as remote as it seemed for he actually passed-out on an Ap-

palachian mountain climb but was fortunate enough to have been found alive. Kay is a graduate of the University of New Hampshire.

**Allan Vaughan**, presently of Utah, has two daughters. The elder, Janice, has two children and the younger, Lois, has three. Allan is Assistant Director of Research. His hobbies are hi-fi music and gardening. The Vaughans occasionally visit Janice in California. . . . **Morris Gordon's** reply to a note-o-gram was prompt. He writes: "1933-40, miscellaneous work, both in and out of engineering; 1940-46, Marine Engineer at Boston Naval Shipyard on warships and cargo vessels; 1946 to date, Mechanical Engineer with the consulting firm of Jackson and Moreland Division in Boston." Morris has worked in mechanical design on requirements of the flow of fluids, gases, steam and air for industrial installation, laboratories, small power plants and steam generating units. He has also worked on M.I.T. installations such as the National Magnet Lab, the Fuels Research Lab and the Instrumentation Lab. Morris is a registered engineer in Massachusetts. One of his daughters is at Simmons and the other expects to enter there this coming fall. Without complaint he tells me that several years ago he developed a malignancy in his right thigh and suffered disarticulation of the hip. He says: "I am able to get around with the use of an artificial limb and canes. At present, I go to work full time but traveling and climbing ladders in and out of trenches are all out. Presumably, I am cured." . . . Bill Bauer, '41, writes: "While making a solicitation of Delaware Valley Alumni for a conference, I contacted a number of 1933 men and urged them to attend the 35th Reunion and to write some information about themselves for the Review. Bill is not yet sure about Reunion. No more faithful attender of M.I.T. functions than Bill can be found, but Clare and Bill have a son, Victor, who is in the Navy and stationed in Roto, Spain, who is to be married in Swampscott, Mass., on June 8. Bill will retire (mandatory) from General Electric in August. The Bauers will then go to Europe, motor through Spain with Victor and his wife and tour Austria, Italy, Switzerland and Germany (where both Bill and Clare were born). Their daughter Linda is living in Amherst, N.H., where she is operating a small, private nursery school for four year olds. Linda has two children.

**Richard Payzant** of Huntsville, Ala., is looking forward to retirement. He has been with the U.S. Army Corps of Engineers for 34 years. Dick attained the rank of Captain while in the service. He spent four years on I.C.B.M. construction in Arizona and Kansas, then 4½ years in N.A.S.A. space construction at Cape Kennedy. He is now working on the Sentinel System Program (Anti Ballistic Missile). He says that this construction will total over a billion dollars. Dick is Chief, Construction

Management Branch, in the Construction Division, Huntsville Corps of Engineers. Dick married Emma, a native of Nova Scotia, over 30 years ago. They have one son, a graduate of Kansas University, who works for Peter Kiewit of Omaha and who has presented Dick and Emma with a granddaughter, Jennifer. Dick has a 26-foot auxiliary sloop (Pearson Ariel), currently docked in Florida. He enjoys both cruising and racing. The Payzants have purchased a house lot in Punta Corda, Fla. The sloop may be docked right against the back lawn! Dick will stay with Huntsville until the A.B.M. project is complete, and then he will build in Punta Gorda. That is what I meant when I said that Dick is contemplating retirement. It is difficult to conceive of a more lovely spot for sailing and cruising than this fine, sheltered harbor at the mouth of the Peace River. Dick and Emma, once they are established at Punta Gorda, will be able to vote for my son, Warren S., who is running for State Senator (Republican), if they wish to do so. Dick has been awarded two civilian awards by the Department of the Army, the second highest awards which the Army gives. The first was for "meritorious civilian service for engineering services performed at Tucson, Ariz., on the Titan II I.C.B.M. construction;" the second award was an Oak Leaf Cluster for "engineering services performed at Cape Kennedy, Fla., Launch Complex 39 Construction (Apollo V Project)." Congratulations, Dick.

**Dick Morse** informs us that his youngest son, Kenneth, will graduate from M.I.T. in June, and this special event might prevent Dick from attending Reunion. We have a report on a symposium on "Power Systems for Electric Vehicles," which is to be made into a book for which Dick has contributed the introduction. . . . **William Klee** of Warren, Ohio, says: "As a matter of fact, I have not indicated a positively negative response to the 35th Reunion question. I indicated doubt." Bill's company, Damascus Tube Company was merged with the Whittaker Corporation and he is now Consultant with the parent company. Bill was President of Damascus for 13 years before the merger. He is serving his fourth and last term as Trumbull County Commissioner. Bill goes on to say: "In the meantime, we have built a house on Hilton Head Island, S.C., as sort of a retreat for relaxation and recreation, but not necessarily for retirement." The only classmate that Bill has any contact with is **John Sterner**, Vice President of the Cordia Corporation of Miami. . . . **James Norcross** of Media, Pa., is Executive Vice President of the Arcos Corporation. He and his wife Helen have three girls. The two eldest are married and have presented Jim with four grandchildren. The youngest has received a master's degree from McGill in Psychology is doing psychological testing of handicapped children. Jim does a lot of traveling and visited Europe twice last year. His present diversion is a



project trying to weld, in one pass, a hundred-inch square of steel. He is Vice President of the Board of Directors of the Working Blind in Philadelphia. He travels throughout the country giving lectures to various chapters of the American Welding Society, often as may as 20 per year. Jim goes to Hill, N.H., to his farm each summer for his vacation.

The Class of 1933 belatedly extends its sympathy to **Morris Cohen** whose wife passed away two years ago. Morris is now on sabbatical leave and is spending it visiting various universities and industrial research laboratories, staying in residence for periods of one week to several weeks. This schedule started right after he returned from a trip to Taiwan and Japan. Morris says that he will certainly try to make the 35th. . . . Our change of address system occasionally turns up a story for us. A routine change came through a few months ago about **William Rand**. He had moved from the San Francisco area to Bakersfield, Calif. I wrote Bill a note asking about this move and he answered that he was tired of the long trips from San Francisco to the Bakersfield area (where the major activities of the Kern County Land and Cattle Company, Bill's company, are located). Bill says that the recent acquisition of Kern County Land Company by Tenneco, Inc., has created some exciting changes as the switch has made him a part of the largest of Fortune's 500 companies. It is evident that Bill will find it easy to pick up in Bakersfield where he left off in San Francisco. The Rands have found a fine home right beside a golf course. . . . We have a few changes of address: **Frederick H. Cooper**, XV (but still in Dallas); **Robert E. Peters**, VI; **David L. Van Syckle**, II; **Le-Burton B. Webster**, XV; and **Warren G. Webster**, VI. All of the changes are available on request. . . . That winds up the notes for this month. We are looking forward to seeing many of you at our 35th Reunion. Yours most cordially and hopefully—**Warren J. Henderson**, Fort Rock Farm, Drawer H, Exeter, N.H. 03833.

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**Hank Backenstoss** writes: "My standing invitation to host classmates with the good fortune or the boldness to pass through Beirut is respected herewith and emphasized. Bring one's own shooting irons—Contax, Leica, Hasselblad or Instamatic! Tel: 290876, residence; 294276, office." . . . **Frank Milliken** was very much in the news all spring because of the copper strike. **George Bull** sent in a picture of Frank in the White House Cabinet Room meeting with the President, several members of the cabinet, other copper people and the union. . . . **George Westefeld** is in the Central Engineering Department of American Brass in Waterbury, Conn. Both his children are married. His daughter is in New Orleans and his son

is in Keene, N.H. He hopes to make the '69 Reunion. . . . **Wilbur Nordos** was appointed, on March 1, 1967, as Administrator of the Re-education Practices Act and of the Division of Intercultural Relations in Education for the New York State Education Department.

**Ernie Massa** tells us: "During 1967, my oldest boy, Ernest, Jr., graduated from Northeastern University and completed his NAVROC training, and is now an Ensign, stationed at Pensacola, Fla., where he lives with his wife. My younger son, Ronnie, is a junior at Northeastern University and expects to receive a B.S. in electrical engineering in June, 1969." . . . **Lawrence C. Ebel** has been named Director-General, Research Laboratories, of Anaconda Wire and Cable Company, it was announced by Herbert C. Witthoft, Vice President of Engineering and Research. He will be located at Anaconda's large research and manufacturing facility at Hastings-on-Hudson, N.Y. Larrie joined Anaconda in 1935 as a Research Engineer, after receiving his master's, and has held various assignments in the general research area. . . . Remember Alumni Day.—**W. Olmstead Wright**, Secretary, 1003 Howard Street, Wheaton, Ill. 60187; **George C. Bull**, Assistant Secretary, Mid-Atlantic, 4961 Allan Road, Washington, D.C. 20016; **James Eder**, Secretary, 1 Lockwood Road, Riverside, Conn.; **Norman B. Krim**, Secretary, 15 Fox Lane, Newton Mass.

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From Denver comes word that **Carl Hedberg** has joined Control Image Corporation (2162 South Jason Street, 80223). He was formerly the Head of the Electronics Division at the Denver Research Institute of the University of Denver. . . . **Bernard Schulman** whose last recorded occupation was investments in Akron, Ohio, can now be found at 200 Atlas Building, 7630 Biscayne Boulevard, Miami, 33138. . . . **Rufus Isaacs** has moved across country to the Operations Research Department of Johns Hopkins University (Baltimore, 21218). . . . As Junior Past President, **Walt MacAdam** still serves on the Board of the Institute of Electrical and Electronic Engineers. His address as Engineering Vice President of the New York Telephone Company is 140 West Street, New York City, 10007. . . . In his capacity as Executive Director of the National Society of Professional Engineers, **Paul Robbins** is frequently called upon to present the point of view of the membership. Recently this meant bringing to the attention of the Senate Committee on Commerce the many ramifications of a possible conversion to the metric system. . . . **John Petrossi**, who spent two years with our Class before becoming involved with the family construction business, recently purchased the Manager Hotel in midtown Rochester. He maintains he knows what *not* to do as a result of an abortive attempt at motel ownership in

Florida. The Petrossis live in the Brighton suburb of Rochester and are proud grandparents of Frank Schumway, Jr.

**Charlie Belts** survived the primary and fall elections last year and is now a Councilman for the township of Glenville, N.Y., which includes Scotia where he lives. When not engaged in this or other civic activities or church work, Charlie is in the building construction business. . . . When this issue of the *Review* comes out just before Alumni Day your Secretary hopes to be traveling in eastern Turkey with her eldest daughter and son-in-law who have been living in Ankara for the past two years. My youngest daughter, Martha, who is completing her junior year at Carnegie-Mellon University, and I hope to leave Boston in early June returning in mid-July. My middle daughter and her husband are living in Las Vegas and Sue is a Patient Counselor at the County Hospital. My son is winding up his four years in the Air Force at Selfridge in Michigan after a year in Thailand, and I am just as busy as ever.—**Alice H. Kimball**, Secretary, 20 Everett Avenue, Winchester, Mass. 01890

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**Joe M. Engel** has recently been named Assistant District Manager at Republic Steel Corporation's Chicago District steel operations. Joe has been with Republic since 1939. He started his career as a member of the Metallurgical Department staff at the Buffalo, N.Y., steel plant. After holding the positions of Mill Metallurgist, Field Metallurgist and Supervisor of Metallurgy, he was named Assistant Chief Metallurgist at Buffalo in 1953 and Chief Metallurgist in 1961. He was transferred to the Chicago District plant in 1963 as Chief Metallurgist, and he has been General Superintendent of the Chicago plant since August, 1965. . . . **Ray H. McFee** has also been recently named Associate Director of Douglas Aircraft Company's Advanced Research Laboratories in



Charles E. Reed, '37

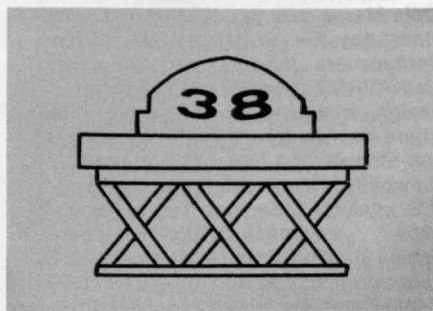


Santa Monica, Calif. . . . **George R. Weppler**, President of Harvey Hubbell, Inc., Bridgeport, Conn., has announced that production has begun on "Circuit Guard," a new protective device to guard against electrical ground faults not cleared by conventional overcurrent devices. . . . John T. Castle's, '47, has been named Division General Manager to head a new G. E. Industry Components and Metallurgical Division with headquarters in Detroit, Mich. . . . **Charles E. Reed** is Vice President and Group Executive of G.E.'s Component and Materials Group. . . . **J. Edward Lynn**, consultant to the textile and allied industries, has been appointed Technical Editor of *American Dyestuff Reporter*. . . . **Paul W. Allen** writes: "Moved to Perth in January, 1965, as General Manager of a new iron ore project being developed to ship four million tons per year. (Goldsworthy Mining, Ltd.). Two of our three boys came with us and entered high school here while the eldest, completed his university training in Paris (University of Paris) and Stanford University. Middle boy now at Stanford. Will be returning with my wife to Pasadena, Calif., late this year."

**Ed Hitchcock** writes that "after 12 years in New York in Union Carbide's International Department, I have now accepted the job of Deputy Managing Director of Union Carbide, India, Limited. I will have under my wing all of Carbide's petrochemicals, plastics and agricultural chemicals operations in India. When approved construction is complete, this will represent over 50 million dollars of investments and about 1000 employees. Our three children will be either married or in college by this September, so Dot and I will move to India. Dot will come back every summer and live in the house we just bought on Lake Candlewood, with the youngest daughter, I will join them for about six weeks each year." . . . Just received the following from Dave Fulton: "Married Vivian Jorgensen Boyce on September 2, 1967. Our family now numbers three all boys, 13, 6, and 5, all in Rye schools. I am now Division Vice President of Chemical Construction, still building chemical plants world wide." . . .

**Ed C. Peterson** is President of Rolling Mill Engineers, Inc., R.D. 2, Douglasville, Pa., which is his own consulting company in the field of mill layout equipment design, mill guides, Bloom, Billet Rod and Bar, and Shape and Narrow strip-mills for the steel industry in the U.S., Europe and South America. He also runs a farm operation with Angus cattle. . . . Our President **Phil Peters** writes that he is, "becoming a world traveler in development of an international network of life insurance companies to work with John Hancock providing employee benefit plans. Subsidiaries of American corporations where ever located can now cover their employees in integrated economical fashion. Went in November and December, 1967, to Caracas, Bogota, Lima, Santiago, Buenos Aires and Rio de Janiero."—**Robert H. Thorson**, Secretary, 506

Riverside Avenue, Medford, Mass. 02155; Professor **Curt Powell**, Assistant Secretary, Room 5-325, M.I.T., Cambridge, Mass. 02142; **Jerome Salny**, Assistant Secretary, Egbert Hill, Morristown, N.J.



# 38

Phone now to **Lou Bruneau** (212-269-5800) or **Norm Leventhal** (617-742-5500), and we may yet have the pleasure of your company at Reunion 30! "A good man does the right thing without being told," Doc W. K. Lewis once said very pointedly to me. "The second-best does the right thing after being told once. Now get moving!" If a last-minute break, or a late-awareness of opportunity has given you a new degree of freedom, call now and experience a change of state. Let us gather at Chatham Bars, beneath the *Tenkoku* which so tastefully delineates the heart of the Class of 1938! . . . While you are reading this on the very eve of Reunion, and the renewal experiences are upon you, it is only the week before Easter as I write. We haven't yet figured out a reasonable schedule for picking up our daughter Kathi from her sophomore year at Simmons, loading the station wagon to way above the gunnels (a girl has more possessions at school these days than the total of what I owned up to graduation!) and managing this tinker's trove over three days in Chatham and one in Cambridge. (I just threw this in to help make your problems look simpler by comparison.)

"In two-and-a-half decades since the end of World War II," says **Ash Shapiro** in his *Report of the Department of Mechanical Engineering*, "engineering education and engineering schools have undergone revolutionary changes. These changes were catalyzed largely by the defense and aero-space programs.

The availability of large government funds for research, the excitement of new vistas at the scientific frontier of engineering, the realization of the importance of technological capability to national security and pride—all these motivated an enormous growth in graduate education and engineering research, as well as remarkable changes in the spirit and content of undergraduate curricula. M.I.T. has been a leader in these developments. More recently, other values have begun to as-

sume their due share of attention. In the last decade many faculty members became dissatisfied with the prospect of expanding our technology mainly in directions stimulated by defense and aerospace needs. Concentration in these directions, by forfeit, tended to steer our best people and our best efforts away from the civilian economy and from those elements that determine the character of human life. Powerful elements of idealism among our students have expressed themselves in similar feelings. A significant number of faculty members, with their students, has turned its attention to such areas as biomedical engineering, inter- and intra-urban transportation, desalination and air pollution. It is now the mood of the country, a mood we share, to make up for the unbalanced efforts of the past and to repair our neglect of those areas in which the well-being of people is the primary concern." To gird for such activity, Ash reports, his department now encompasses three functional areas of concentration: mechanics and materials, thermal and fluid sciences, and systems and design.

"The price of social and economic progress in technology is—noise pollution." **Vincent Salmon**, Ph.D. '38, proclaimed in an article on this major urban menace. Vince is a consultant to A.R.C.O.N. (Audiology Research Consultants, Inc., in Palo Alto). Commenting on the problems of jet transportation, construction, metal fabrication, and even the discotheque, Vince says: "Management needs to realize that a hearing conservation program is to its economic advantage and that it will assist immeasurably in maintaining the company's reputation as a socially-aware member of the community." . . . **Peter Cole**, who has been involved in systems analysis and biophysics, is now Manager, Radiation Division, of Sanders Associates, Nashua, N.H. . . . **Gordon Foote** says: "I became a grandfather for the first time January 10. A daughter, Ramsay McCall Ringo, was born to my daughter Margaret Foote Ringo. Her husband is on duty with Adjutant General Office in Saigon, and we are looking forward to his return in June, 1968. . . . Colonel **Sam Steere** was presented his certificate of retirement and third award of the U.S. Air Force Commendation Medal in February. Colonel Sam, who was cited for extraordinary professionalism and leadership, received the medal for his distinguished service as Wing Deputy Commander for Materiel of the 325th Fighter Wing, at McChord A.F.B., Wash.

**Don Severance** has forwarded this tremendously interesting note from **Clark Robinson**; datelined Novasibirsk, 90, U.S.S.R.: "There is no M.I.T. Club here, but possibly it is in the plans for the future! I thought you might like to hear what I have been doing this winter, since it is a little different from my usual activities at the University of Illinois. Since October I have been

here at the Soviet Scientific town, or Akademgorodok, 15 miles south of the city of Novosibirsk in western Siberia. This is a town of about 35,000 people, devoted entirely to science. It includes about 15 scientific research institutes and a first-rate university. For some years I have been studying the Russian language in my spare time, and this year I am visiting the Akademgorodok for seven months on a scientific exchange between the Inter-University Committee on Travel Grants, which has its headquarters at Indiana University, and the Ministry of Higher Education of the U.S.S.R. While I am officially attached to Novosibirsk State University, I actually work at the Nuclear Physics Institute. This institute, which is directed by Professor G. I. Budker, is well known for its work on electron accelerators and plasma physics. In addition to spending a large amount of time improving my Russian and getting acquainted with this community and its surroundings, I am engaged in some experimental work related to the magnets for the new accelerator-storage ring VEPP-3. This has been a very satisfactory exchange, from my point of view, and the Russians must be reasonably happy with it, since they recently extended it from the original four months to seven months, at my request. This is the first year that any American Visitors have been allowed here for extended periods. At present there are two others here, under the exchange program operated by the National Academy of Sciences. I live in the hotel, which is very comfortable, and which houses most of the many scientific visitors who come here from other cities in the U.S.S.R. and from Eastern Europe (as well as a few from Western Europe). The Soviets have worked hard to make this town attractive to the best scientists, and out of about 150 academicians in the U.S.S.R. 10 of them are here. The housing is generally in apartments, but many senior people have a house, or often half a house, in the very pleasant wooded residential area. The stores are reasonably well stocked, and there is excellent bus service to the city of Novosibirsk (I often go there to see operas or ballets). In the Akademgorodok there are two movie theatres, which show the latest films. There is a very large number of excellent musical events at the new concert hall (1000 seats.) For example, the Novosibirsk Symphony Orchestra is giving a series of 16 concerts here this winter. Naturally, I have a season ticket. This orchestra is really very good. Recently American conductor Efrem Kurtz was guest conductor. The surrounding country is mostly wooded, and has many hills and streams. The woods are both birch and pine. During the last two months I have explored the surroundings at some length, on skis. This winter has been unusually warm, and today (March 23) the snow is melting rapidly. I have been fortunate in making the acquaintance of many individuals here: scientists, students, artists, musicians, etc. The

scientists often speak some English, but the other groups usually do not, and this is a great help in my attempt to learn Russian better! I expect to leave here about May 10 and return home via Moscow, Leningrad and London. I don't see the *Technology Review* here, so if you have time do drop me a line . . . I am planning to attend the 30th Reunion but I need to know the exact date!" By now, Clark knows it is June 7-9, at Chatham Bars, and June 10, in Cambridge, if he can come from Siberia, what's delaying you!

There is a note of sadness in the death of **Fred Lamoreau**, Professor of Mathematics at the University of Maine, on March 27. Fred (somehow) accumulated 37 years of teaching at the University of Maine! He had said: "My primary interest is in applied mathematics. My hobby is the State of Maine."—**Frederick J. Kolb, Jr.**, 211 Oakridge Drive, Rochester, N.Y. 14617

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Several '39 promotions to report this month. **William S. Brewster** (II) has been elevated to Chairman of United Shoe Machinery Corporation, Boston. Bill also retains the chief executive function. . . . **Walter M. May** (II) has moved up to Executive Vice President, Operations, at Mack Trucks, Inc., of Allentown, Pa. It is interesting to note that both Bill and Walt joined their respective com-

panies upon graduations, and have steadily moved upwards in the two companies ever since. . . . **Winthrop M. Leeds** (VI), 212 Overdale Road, Pittsburgh Pa. 15221, has been appointed Consulting Engineer for the Power Circuit Breaker Division of Westinghouse Electric Corporation. . . . **Albert C. Rugo** (I), heading up his own firm of architects, in Milton, Mass., was sworn in on January 23 by Governor Volpe as the Architect of the Board of Standards in the Massachusetts Department of Public Safety. Al sent along a delightful news photo and clipping of the swearing in Ceremony, including himself, the governor and the family of wife Maureen, daughters Maureen and Victoria and son John.

**Mortimer A. Schultz** (VI) has been appointed Professor of Nuclear Engineering at the Pennsylvania State University, University Park, Pa. Prior to this appointment, he was President of Milletron, Inc., manufacturer of nuclear instrumentation and heavy industrial electronics equipment, in Pittsburgh. . . . **Harold S. Chestnut** (VI-A) was elected by the Annual Assembly of the Institute of Electrical and Electronics Engineers, Inc., to serve as Treasurer for the year 1968. Hal is Manager of Systems Engineering and Analysis of the Research and Development Center, General Electric Company, Schenectady. If you wish to learn more of Hal's extra-curricular activities, browse through his recent book *Systems Engineering*



Samuel A. Steere, Jr., '38 (left), was presented the United States Air Force Commendation Medal by Colonel Harry L. Downing (right) upon his retirement from the Air Force after 27 years of active duty. Colonel Steere, who was cited for extraordinary professionalism and leadership, received the medal for his distinguished service as Wing Deputy Commander for Materiel of the 325th Fighter Wing at McChord Air Force Base, Wash.



*Methods*, published by John Wiley and Sons. . . . **Myer M. Kessler** (VII), Associate Director of the M.I.T. Libraries, has developed a working model of an on-line retrieval system for selected bibliographic information in the field of physics. His system is based upon the Multiple Access to Computers (M.A.C.) time sharing system. His work was referred to in the Winter issue of *Electronic Age*.—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

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These notes are being written in rather hectic times. Your Secretary went to Memphis two days after the rioting there and returned to Washington just in time for the riots in Washington. It is hoped that by the time this column reaches you, the country will again be serene and progress will have been made in inter-racial relations. . . . It is with regret that I must report the death of **John D. Rittenhouse** on February 19, 1968. John was a member of Course X and received his master's degree. He was a resident of San Rafael, Calif., at the time of his death. . . . **Divo Tonti**, XV, is still Executive Director of the New Jersey Highway Authority that operates the popular and very prosperous Garden State Parkway and has almost finished the Art Center on the Parkway with a gorgeous building designed by Edward Durrell Stone, '27. The Art Center is to open with the Philadelphia Orchestra this June. Divo is also President of the Bayshore Community Hospital. . . . From P.P.G. Products comes the following: "Scientists at the National Center for Atmospheric Research in Colorado are concerned only incidentally with calming the turbulence of human indignation that sometimes envelopes local weather forecasters. The Center's reason for being is basic research; its stated goal to achieve ' . . . a fundamental understanding of natural phenomena.' In the sculptured structure that protrudes from a mesa in the Flatirons near Boulder, Architect **I. M. Pei**, IV, has shown precisely that—a fundamental understanding of such natural phenomena as mountains and mesas and pines. The two, five-story towers of the N.C.A.R. complex appear to have been driven into the flat of the mesa, then laced, by courts

and bridges, to a lower, central structure. Dr. Roberts, who selected the 500-acre site, did not want the landscape disrupted. Pei complied. The Director had a second dictum; give the scientists privacy to concentrate. And Pei's towers, the working labs and offices of the scientists, are pure ivory. They are isolated architecturally from the 'public' lobby, commons room, and exhibit areas. Visitors have been designed-out of the labs and offices."

**Dave Morgenthaler**, II-A, has been elected Chairman of the Board of A.P.I. Instruments Company. He will also serve as a consultant on long-range planning for A.P.I., a leading manufacturer of electrical and electronic instruments. Dave, in addition, is Director of Space Comfort, Inc., and of Ohio Industries, both of Cleveland. He has been President of Foseco, Inc., of Cleveland for the past 10 years and is still a Director of that Company and is a Trustee of the Lakewood Ohio Hospital. . . . In a recent article in *Newsweek* about Litton dropouts (known as "Lidos") reference is made to **Henry Singleton**, VI-A, who now has Teledyne. . . .

**Barry Taft**, XIX, writes: "I've finally taken the plunge and gone into business for myself. Note the enclosed business cards. So far neither job has proved very lucrative, but here's hoping." Barry describes himself as a consulting metallurgist and materials engineer with 27 years experience. His office is at 757 Highway 17-92, Fern Park, Fla. 32730, and he is President of Dixie Metals, Inc., with offices at the same address. Dixie Metals manufactures lead products, including "Amplex" die cast, wheel weights and "Dixie" fishing sinkers. Good Luck in your new ventures. . . . As a final note, we have the following changes of address:

**Robert N. Bonnett**, 132 Highland Avenue, Newark, N.Y. 14513; **Richard H. Hutzler**, 10837 Portofino, Los Angeles, Calif. 90024; **David T. Morgenthaler**, 13904 Edgewater Drive, Cleveland, Ohio 44107; **David L. Mowrer, Jr.**, Deutsche Uniroyal, Englebert AG, Huttenstrasse 7, 5100 Aachen 1, Germany; **George E. Niles**, 10128 East Maple Street, Bellflower, Calif. 90706; **M. Wayne Sotfile**, 214 West Oakridge Park, Metairie, Los Angeles, Calif. 70005; **Eugene S. West**, 05-53-702-'55, B Co.—4th Bn, 1st Ait-BOE, 1st Platoon, Ft. Dix, N.J. 08640; and **Mrs. Stephen White**, Box 232, Rancho Sante Fe, Calif. 92067.—**Alvin Gutttag**, Secretary, Cushman, Darby and Cushman, American Security Building, Washington, D.C. 20005

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**Henry Avery** represented M.I.T. at the Inauguration of Wesley Wentz Posvar as 15th Chancellor of the University of Pittsburgh on March 27, 1968. Hank is associated with U.S. Steel Chemicals Division, 2104 Grant Building, Pittsburgh, Pa. . . . **Kenneth C. Spengler**, Executive Director of the American Meteorological Society, has been

awarded the Charles Franklin Brooks Award for Outstanding Services to the Society. The award to Kenneth read: for "his many contributions to the Society extending beyond those expected of the Executive Director, for the important part he had in the acquisition and restoration of the magnificent headquarters of the Society, and for his untiring efforts to have the Society keep pace with the great advances in the atmospheric sciences." Kenneth was born in Harrisburg, Pa. He received training as the first aviation cadet in the Army Air Corps Meteorology Program after which he was assigned to the Army Air Force Headquarters as Secretary of the newly formed Weather Research Center, and in 1941 was active in organizing the Army Weather Central. Under his direction, the Weather Central pioneered in weather analyses and forecasting on a hemispheric scale. He returned to civilian life in 1946 and assumed new duties as Head of the American Meteorological Society's Executive Office in Boston. Under his stewardship the Society has grown from 2500 members to over 8000 with a budget increase from \$25,000 to \$1,000,000. Through his efforts, the Society acquired the Harrison Grey Otis House at 45 Beacon Street and restored it for its historic value as well as suitable Society headquarters. He is a Board member of the Council of Engineering and Scientific Societies' Secretaries, a member of the Managing Officers of Scientific Societies and holds the rank of Brigadier General in the U.S. Air Force Reserve.

**Franklin W. Kolk** has become the recipient of the Flight Safety Foundation's Luis de Florez Flight Safety Award. Franklin is Assistant Vice President, Engineering Research and Development, at American Airlines. . . . **Fritz R. Krum** has been promoted to the position of Director of Corporate Engineering at General Aniline and Film Corporation. He was formerly Chief Engineer for G.A.F.'s Photo and Reprographic Products. He joined G.A.F. in November of 1964, as Technical Assistant to the Vice President and General Manager of the Photo and Reprographic Division. He was promoted to Chief Engineer in the Corporate Engineering Department in March, 1965. Prior to joining G.A.F., he was Executive Staff Engineer with the Lummus Company, and Senior Process Engineer at Bechtel and the M. W. Kellogg Company. He resides with his wife, Judith, and their three children on Old Church Lane in Lewisboro, N.Y. . . . **George S. Burr** was recently featured in the news as a co-founder of Instron Corporation which from small beginnings in Quincy, Mass., has grown to a present 52,000 square-foot plant off Route 128 with a projected increase to 132,000 square feet under way this year. The firm also has a manufacturing plant in High Wycombe, England, nine sales and service centers located throughout the U.S. and Canada with similar facilities in England, Switzerland, France,

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Sweden, Spain and Japan. The company specializes in destructive testing equipment, most of which is custom tailored to customers' particular testing requirements. It is an outgrowth of finding solutions to problems encountered during George's work at M.I.T. in the World War II period. The firm boasts an annual sales increase of over 20 per cent over the past 10 years and now has 375 employees plus numerous factory reps.

**Harry H. Wasserman** has been made President of the Organic Chemistry Division of the American Chemical Society. He received his Ph.D. in 1949 from Harvard University. From 1943-45 he served as a Chemical Officer in the Air Transport Command. He was an Instructor at Yale in 1948; an Assistant Professor, 1951-57; and Associate Professor, 1957-62. He became a Professor in 1962 and was Chairman of the Chemistry Department from 1962-65. He was a Guggenheim Fellow, University of California, Berkeley, 1959-60. Currently he is American Editor of *Tetrahedron* and *Tetrahedron Letters*, and on the Advisory Board of A.C.S. Monograph Series. . . . **Raymond W. Ketchledge** gave the Commencement Address at the Illinois Institute of Technology. His topic was "Organizing For Innovation." Ray is Executive Director of the Electronic Switching Division of the Bell Telephone Laboratories, Inc., Indian Hill Laboratory, Naperville, Ill.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; **Everett R. Ackerson**, Assistant Secretary, 16 Vernon Street, South Braintree, Mass.; **Michael Driscoll**, Assistant Secretary, 63 Center Street, Nantucket, Mass.

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**Monroe Sadler** has been appointed Assistant Director of Du Pont Company's Development Department at Wilmington. In his previous position as Laboratory Director, he was in charge of research on organic solids and on refractory and on magnetic materials. . . . **Francis B. Herlihy**, a Corporate Vice President of Abex Corporation, has been named Director of Research for the company. . . . **Walt Robbie**, who is President of the Eaton Paper Company, has been elected to the Board of Trustees of the Berkshire County Savings Bank in Pittsfield, Mass. . . . **Robert C. Seamans, Jr.**, who attended graduate school with our Class, is a candidate for election to the Harvard Board of Overseers.

**Dick Hughes** leaves his position as Head of the Chemical Engineering Department at Shell Development Company's Emeryville, Calif., Research Center to become Staff Engineer at Shell Oil's Norco, La., Refinery. . . . **Aniceto C. Santos** has retired from the Brazilian Navy as a Rear Admiral and is now Director of Ishikawajima do Brasil Estaleiros, S.A., shipbuilders.

A letter datelined from Margaritas, Mexico, sent by William L. Dennen, '17 tells us that **Bill Dennen** is not only Professor of Geology at the University of Kentucky as reported in recent Class notes, but is Chairman of the Department there! Glad to see that notes are read. . . . **Bob Bunn**, Vice President of Manufacturing of the Wooster Brush Company, died unexpectedly while addressing a meeting at the company's annual Service Award dinner. We extend sincerest sympathy to his family.—**Ken Rosett**, Secretary, 191 Albemarle Road, White Plains, N.Y. 10605

## 44

**Eugene W. Sard**, VI, is co-author of an article in the December 1967 *I.E.E.E. Transactions on Electromagnetic Computability*. The article is entitled "Superconducting Ultrahigh Q Tunable RF Preselector." The performance is obtained by cooling the conducting material to the temperature of atmospheric liquid helium. . . . Speaking of the I.E.E.E., our anonymous traveling correspondent (see March notes) attended the recent I.E.E.E. show, presumably in New York City, where he met a number of classmates and through them obtained news of others. Among the classmates was **Holton Harris** with an exhibit from Harrel Incorporated. Holton now lives in Westport, Conn., where he is presently engaged in a strong neighborhood campaign against a zoning change which would result in considerable traffic on his street. Our Class President, **John Hull**, was at the I.E.E.E. show with an exhibit from the Hull Corporation of which he is President. John reports that his company has just established a plant in Scotland but he has been unable to visit Scotland to see it. He is active in the Educational Council in the Philadelphia, Pa., area. He has had occasion to meet **Richard E. Whiffen** who is with a firm manufacturing aircraft components in Bucks County, Pa. John also indicated that he had heard from **Andrew Buccini**, Vice President of the A.M.F. Bakery Division in Richmond, Va. Butch apparently had trouble with his back and was hospitalized. As of mid-March he was recovering at home. At the I.E.E.E. show our correspondent also met **Dave Jealous**. Dave is Eastern Regional Manager with Machinery Magazine and has been traveling extensively. That concludes the report from our correspondent.

Now we turn to chemical engineering. **James A. Finneran, Jr.**, X, of the M. W. Kellogg Company, participated in the 63d national meeting of the American Institute of Chemical Engineers held in St. Louis, according to a clipping from an unspecified magazine received in March. The subject of the presentation was startup performance of 21 ammonia plants for which contracts were awarded to Kellogg in the last four years and which have now been com-

pleted or almost completed through startup. According to the analysis by a three-man team from Kellogg, of which Jim was one member, initial ammonia production is scheduled and reached, ideally, 23 days after startup which begins when feed is introduced to the plant. Most of the plants operate on natural gas although five take naphtha and one is fed refinery gas. Ideally, full production (1000 tons daily for most of the plants) is reached 32 days after startup. The study reveals that there is an even chance that capacity production will be reached within two months after startup and a 75 per cent probability that capacity production will be reached within four months. As I recall, we're all supposed to know something about the ammonia cycle, are we not? Perhaps the Educational Councilors can answer that question, for example, **Robert B. Meny** or **Edwin G. Roos** of the New York City area or **Robert M. Copsey** in the Los Angeles area. Incidentally, Jim Finneran, who started this, is in the New York City office of the Kellogg Company.

During the past month I had the pleasure once again of having lunch with **Sam Parkinson** at the Pentagon on one of his frequent trips to Washington from Grumman Aircraft Engineering Corporation, on Long Island. . . . Later in the Month **Richard J. Kulda** arrived on a business trip for his Ship Systems Technology Corporation, Orange, Calif. My wife, China, and I were delighted that he was able to come for dinner. A week later, China and I spent Saturday evening with Mary and **Al Picardi** at their home in Rockville, Md. Their son Tony, a sophomore at M.I.T., was home for Spring vacation which was the occasion for our visit. We had the unexpected pleasure of the arrival of Tony's older sister Mary, a junior at Tufts University, and her fiancé, Steven Hilton of Philadelphia, a senior at Tufts. Their wedding date is set for Sunday, June 9, in Boston. Steve has been admitted to medical school at New York University. Mary, with only eight credits to go, will graduate in August. She will also enter New York University in September where she has a graduate fellowship in "Environmental Biology in Medicine." It was an educational Saturday evening. We may even have bridged the generation gap. We heard the views of the students on the draft, the war in Vietnam, the civil disorders in this country and the related campaigns for the Presidency of the United States. Surprisingly, perhaps, there was agreement among those present that there is a subtle and complicated but nevertheless real connection between the war in Vietnam and the domestic civil disorders. The following evening President Johnson announced that he would not seek and would not accept the nomination of his party for another term as President. Four days later came news of the assassination of Dr. Martin Luther King, Jr., in Memphis. As these words are written, American flags are at half-mast

around the world and Washington, D.C., has experienced four days of rioting with extensive fires and looting. The city is under curfew and **Al Picardi** reports that soldiers are guarding the building on Connecticut Avenue in which his office is located. The Poor Peoples' March on Washington is scheduled to occur well before these words appear in print. In this presidential election year, the frenzied pace of the news shows no sign of let-up.

Alumni Day this June 10 marks the one-year-to-go point for our 25th Reunion. The Reunion Gift Committee chaired by **Robert S. Faurot**, Western Felt Works, 4115 Ogden Avenue, Chicago, Ill. 60623, appears to be active. Incidentally, June is the last month for contributions to the 1968 Alumni Fund, and the contributions count toward our 25th Reunion Gift. Your Secretariat would be most appreciative if those who will be sending in contributions would also include a message for these notes, especially if the comments are responsive to this column as indicated by a salutation. Those of you who have already contributed can still correspond, of course. In fact, you can get double brownie points by writing to another classmate and simply sending a copy of your letter to us. We even give brownie points for notification of a change of address. And you don't have to do it yourself if you get your wife or secretary to do it. It's really quite easy.—**Paul M. Robinson, Jr.**, Secretary, Navy Information Systems Division (Op-914H), Pentagon 4D525, Washington, D.C. 20350, 202-697-6115 or 7710 Jansen Drive, Springfield, Va. 22150, 703-451-8580; Assistant Secretaries: **Paul M. Heilman, 2d**, Copper Development Association, 405 Lexington Avenue, New York, N.Y. 10017, 212-687-6500 or 30 Ellery Lane, Westport, Conn. 06880, 203-227-3469; and **John G. Barmby**, I.I.T. Research, 1825 K Street N.W., Washington, D.C. 20036, 202-296-1610

## 47

As I sit down to write these notes on a rainy late afternoon in Muncie, Ind., I find the file rather slim. **John G. Truxal**, who is Provost at the Polytechnic Institute of Brooklyn and resides in Huntington Station, was certainly the appointee of the month. He was made Chairman of the Committee on the Interplay of Engineering with Biology and Medicine by the National Academy of Engineering and was also elected as a director at large to the Board of Directors of the I.E.E.E. That should keep him busy for awhile. . . . **Edward Bennett** is leading a group that has left Mitre Corporation to set up a new company, Viatron Computer Systems, in Burlington, Mass. . . . **Robert Buford** is responsible for all mechanical and electrical design with the Richmond, Va., consulting engineering firm now called Torrence, Dreelin, Farthing and Buford. . . . **John C. Martin** has been promoted to Chief Engineer of Frigidaire. He has been Director of Private Brand



Kenneth L. Block, '47

Operations so will remain in Dayton. . . .

**Ken Block** is now Regional Vice President in charge of the central region of A. T. Kearney and Company, international management consulting firm. Ken joined Kearney in 1948 after obtaining his M.B.A. at Michigan and resides with his wife Marge and their three children in Glen Ellyn, Ill. . . .

**Ed Doyle** is moving from Wisconsin to the Lamson Division of Diebold, Inc., in Syracuse. . . . **Tom McEvoy** has moved from New Rochelle to Katonah, N.Y.; **Alfred Parziale** from Milwaukee to Topsfield, Mass.; **John Sutton** from Laguna Beach to Los Altos, Calif.; **Hugh Slawson** from Webster to Rochester, N.Y. . . . **Joe Riley** has moved but stays in Chatham, N.J. Joe, we were probably neighbors a few years back and never knew it. . . . It is cocktail time so until next month—let's hear from you.—**Dick O'Donnell**, Secretary, 28516 Lincoln Road, Bay Village, Ohio 44140; **Arnold Varner** Harvey Hubbell Company, Newtown, Conn.

## 48

**Charles B. Reimer** was the lead author of an article in the December, 1967, issue of the *Journal of Virology*. The title of the article: "Purification of Large Quantities of Influenza Virus by Density Gradient Centrifugation." In July of 1967 Charles resigned from Lilly Research Laboratories in Indianapolis to join the staff of the National Communicable Disease Center, Atlanta, Ga. 30333. The article deals with the use of the zonal centrifuge in connection with the current effort to produce greater quantities of more effective and safer influenza vaccines. Charles is Chief, Biophysical Separation Laboratory, at the N.C.D.C. He and his wife Hester are the parents of five children: Christine (18), Susan (17), Stephan (15½), Mark (12), and Eric (6½). . . . **William J. Grant** has been appointed as Regional Chairman of the Alumni Fund for Clifton, Fair Lawn, Glen Rock and Paramus, N.J. Bill was

also recently presented with a bronze plaque at the Glen Rock Jaycees Spring installation dinner as the recipient of the local chapter's award for outstanding physical fitness leadership. Eight years ago he began assisting in the St. Catherine's Church C.Y.O. track and field program and subsequently became the track and field coach, a voluntary non-paid responsibility. He was also instrumental in developing a country-wide track and field program for elementary school children which now hosts about 2000 children each year. . . . **Walter L. Koltun** has been named Director of the Program for Advanced Study at Bolt Beranek and Newman, Inc., of Cambridge.

**Harry G. Jones** has been appointed A.C.F.'s Director of Corporate Planning in New York. He will concentrate on the development of new venture opportunities for the company. Harry was most recently with Barber and Company, a New Jersey consultant firm specializing in venture analysis, of which he was Vice President. . . . **Israel Stollman**, M.C.P. Professor and Head of City and Regional Planning, a Division of the School of Architecture in Ohio State University's College of Engineering, was extensively quoted in a February release from the Ohio State University News and Information Service. Mr. Stollman is past President of the Association of Collegiate Schools of Planning and is the Chairman of the ethics committees for both the American Institute of Planners and the American Society of Planning Officials. The quotes were all concerned with his views on the design and improvement of cities. He claims that cities can be "delights, entertainments" if we will "design with the realization of what it can be like to move pleasantly through space." . . . **Clark L. Drasher, Jr.**, of Laurel Hollow Road, Syosset, N.Y., and Associate Managing Partner, A. W. Jones and Company, New York, was one of six graduates of M.I.T. recently awarded the professional designation of Chartered Financial Analyst by the Institute of Chartered Financial Analyst. . . . **William H. Bertolet** will represent the Institute at the inauguration of Paul Russell Anderson as President of Temple University on May 1.

**Dean S. Ammer** is Economics Editor of *Purchasing Magazine* and author of that publication's regular feature, "Pulse of Business." He is also Director of Northeastern University's Bureau of Business and Economic Research. In the February 8, 1968, issue he was the author of an article entitled "Take the Guesswork out of Buying" which showed the application of Bayesian probabilities to decision-making problems in the purchasing field and which, incidentally, promises to provide some motivational material for a certain class of seniors in a certain prep school in Connecticut. . . . **Theodore R. Yoos, Jr.**, has been appointed Manager



of Dyna-Tech Corporation's Products Division in Burlington. He will be responsible for the total operations of the company's welding, biomedical and thermoelectric cooling product groups.

... **Frank M. Sanger, Jr.**, Captain, U.S.N., is Deputy Manager, A.S.W. Systems Project Office, Navy Department.

... **Spero P. Daltas** reports from Uganda that the firm of Brown, Daltas and Associates has opened an office at 221 East 48th Street, New York, to carry out work for the State University Construction Fund, and an office at 2 Katego Road, Kampala, Uganda, for the design of four regional colleges and the expansion of East Africa University for the Government of Uganda and A.I.D. ... I hope that by the time these

notes go to press along with the rest of the June issue a large number of us will have made the decision to join our classmates at the 20th Reunion.

If you're on the fence and you still have time when you read this, rush to make a reservation! You'll be glad you did.—**Robert R. Mott**, Secretary, Kent School, Kent, Conn. 06757;

**John T. Reid**, Assistant Secretary, 22 West Bryant Avenue, Springfield, N.J. 07081; **Richard V. Baum**, Assistant Secretary, 6711 North 22 Street, Phoenix, Ariz. 85016

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By the time you read this, you should have received the first class-wide mailing from your 20th Reunion Committee. The basic formula is simple: save part or all of the week of June 8 through June 15, 1969, to have the time of your life with the rest of us on the beautiful island of Bermuda.

We'll be staying at the Castle Harbour hotel and enjoying beach picnics, boat rides and deep sea fishing, along with some organized activities toward the latter part of the week. Come for as long as you like but the longer the better so far as your hard-working Committee is concerned. ... **Tom Toohy** writes

that he has moved to Greenwich, Conn., and is the Marketing Procedures Manager for I.B.M. in White Plains, N.Y. The Toohys are the proud parents of a third daughter, Megan. ... **William G. Berresse** has moved out west where he is Plant Manager of Rexall Chemical's West Coast polystyrene plant. Bill's new address is 25201 Calle Vieja, South Laguna, Calif. 92677. ...

**F. William Bloecher**, who received his master's degree in metallurgy with us in 1949, has been appointed Deputy Director, Europe-African Region, by the American Cyanamid Company in Wayne, N.J. With Cyanamid since 1951, Mr. Bloecher was Manager of the Natural Resources Department of Cyanamid for a year and was previously Manager of Phosphates in that department. He holds a bachelor's degree

in mining engineering from Lehigh University. He and his wife, Eleanor, live in Wyckoff, N.J. ... **Henry S. Rowen**, President of the RAND Corporation, gives a thoughtful look into the near

distance in his paper "Space Program: The Future," which appeared in the February, 1968, issue of *Astronautics and Aeronautics*. Henry says that, despite budget cuts which have been necessary in space and numerous other large government programs, the space program will contribute substantially to the world's welfare not only through the discovery of new scientific principles but in a major way through the development and launching of communications satellites. Because of the latter effort, millions now denied an adequate education will be effectively instructed through TV programs bounced back to selected areas on earth from satellites.

**Sherwood Stockwell** is a member of the newly-formed partnership of Bull, Field, Volkmann, Stockwell Architects, A.I.A., which practices architecture and planning with main offices at 400 Pacific Avenue, San Francisco, Calif. Sherwood has been a Director of the Guardsmen (a San Francisco Youth Organization), a Commissioner of the San Francisco Planning Commission and is a Director and member of the Executive Committee of the California Planning and Conservation League. He has received six awards since 1958 for design excellence. ... **Isaac C. Fosier** represented the Institute at the inauguration of John Carl McCollister, Jr., as President of Limestone College in Gaffney, S.C., on April 10, 1968. Isaac is Manager of Production Administration for the Cryovac Division of the W. R. Grace Company in Duncan, S.C. ... **Thomas W. Folger**, '48 is one of six Tech men who were recently awarded the professional designation of Chartered Financial Analyst by the Institute of Chartered Financial Analysts

at the University of Virginia in Charlottesville. Tom is Vice President and Director of Research for Kidder, Peabody and Company, Inc., New York City. ... **John F. Elliott**, Professor of Metallurgy at M.I.T., has recently been made a Fellow of the American Institute of Mining, Metallurgical, and Petroleum Engineers. Dr. Elliott, who received his Sc.D. from Tech in 1949, is the author or co-author of over 65 papers and four books. Have a nice summer!—**Fletcher Eaton**, Secretary, 42 Perry Drive, Needham, Mass. 02192

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**Marvin L. Baker**, Arlene and their two children Teddy, 6, and Peter, 4, live in Alamo, Calif. He has been with Shell Chemical Company since graduation. For the past year he has been Plant Manager of the Martinez California Plant which manufactures isobutylene derivatives and development quantities of new chemicals. Prior to Martinez, he was Manager of Elastomer Development at the Synthetic Rubber Technical Center in Torrance, Calif. ... **George Brown**, Professor of Mechanical Engineering Applied Mechanics and Ocean Engineering at the University of Rhode Island, lives in Wakefield, R.I., with his wife Joyce and children Pamela, 11, and Jody, 10. ... **Charles T. Chadwick**, Supervisor, Electronic Test Section, at Sikorsky Aircraft lives in Bridgeport, Conn., with Elvira, Joe, 7, Judy, 10, and Joyce, 16. ... **Dale O. Cooper** took some time off as Manager of the Getty Oil Company, Management Science Department, to work with some 200 businessmen volunteers on Governor Reagan's survey on efficiency and cost control.



Peter C. Hand, '48 (left), was Chairman of the 1968 Florida Festival—a special M.I.T. gathering in Orlando, Fla., on January 27 sponsored by five M.I.T. clubs in Florida. He is shown here with Dr. and Mrs. James R. Killian, Jr. ('26); Dr. Killian was a principal speaker in the Festival program.



Dale's work included analysis of the efficiency of the state's computing and fleet management activities and some of his recommendations, with several million dollars in savings, have already been put into effect. He reports that hundreds of millions in savings were indicated by the survey team. . . . **Donald C. Cronmeyer**, Sc.D. VIII, and his family Anita, Paul, 12, Timothy, 11, Lois, 9, Mark, 7, Mary, 3, have moved from Wheaton, Ill., to Ossining, N.Y. He is now with the I.B.M. Research Center in Yorktown Heights as Advisory Physicist in the Federal Systems Division.

**Robert W. Dobbins** is an Instructor of Physics at the Union County Technical Institute and lives in Westfield, N.J., with Helen and Jonathan, 7, Jennifer, 3, and Melissa Ann, 2. . . . **Ralph H. Evans**, when not skiing or canoeing, is in the Plant Management Office of R.C.A. in Burlington, Mass. . . . **Allen B. Fonda** now lives in Penfield, N.Y., and is working with automated materials handling systems, primarily for hospitals, at the Ritter Pfaudler Corporation, Castle Automated Systems Division, in Rochester, N.Y. . . . **Henry P. Hall** is with the General Radio Company and lives in Concord, Mass., with Sarah, Richard, 15, Kathy, 13, Sam, 10, Chris, 7, and Jim, 2. . . . **Yngve Gust Hendrickson** is Senior Research Chemist for Chevron Research Company. Gust and Nancy live in El Cerrito, Calif., with children Joyce, 2, and Kristine, 1. . . . **Albert G. Hurd** and Torvy, Johnathan, 10, and Christopher, 8, live in Bedford, Mass. He is with G.C.A. Corporation. . . . **Ernest F. Jensen** is the owner of Jensen of Jacksonville, Inc. He lives in Jacksonville, Fla., with Sandy, Mary Ann, 11, and Stephen, 9. . . . **Lawrence Kuszmaul, Jr.**, worked on the Construction of Holt Lock and Dam which was recently completed on schedule. . . . **Solomon B. Levine**, Ph.D. XIV, is a Professor at the University of Illinois. He has also taught at M.I.T. and as a visiting Professor at Penn State and Keio University, Tokyo. He is the author of over 35 articles in the English and Japanese language, and the book *Industrial Relations in Postwar Japan*, and he lectures on the problems of Southeast Asia. . . . **Robert C. Lewis** has worked for the Boeing Airplane Company in Seattle, and the Navy Department, in Washington, D.C. Bob was an Air Force Chaplain for three years and is now Assistant Manager of Armed Services Activities of the First Church of Christ Scientist in Boston. Bob and his wife live in Medfield, Mass.

**Charles Maki** and his family Bertha, Peter, 16, Paul, 11, Robert, 9, Beth, 4, and Karl, 1, have moved from Minnesota where Chuck was Chief Engineer, Aero Division, of Honeywell to Phoenix, Ariz., where he is Senior Vice President Ameco, Inc. . . . **Robert F. McIntosh**, S.M. XVIII, is Manager for Corporate Applications Development at Planning Research Corporation, Washington,

D.C. Before joining Planning Research in 1959, Bob was Manager of the Logistics Section, Technical Military Planning Operation, at General Electric, and taught mathematics at M.I.T. and the University of California.

**Forest C. Monkman** has joined Allis Chalmers as manager of their newly formed Industrial Tractor and Equipment Department. His Responsibilities also include division wide engineering and planning and market Development. Wauwatosa, Wis., is home for monk, Marilyn, Dick, Martha, Tracy and Ned. . . . **Louis D. Moore, Jr.**, Ph.D. V, was selected speaker of the year for the N.E. Tennessee section of the American Chemical Society, and gave an address to the group on the molecular makeup of polymers. . . . **David M. Pellish**, M.Ar. IV-A, Linda, and their son Stuart, 11, live in Washington, D.C., where he is serving on the presidentially appointed National Commission on Urban Problems.

**Howard L. Schaeffer**, Elinor and Jeff, 11, Cindy, 4, and Greg, 2, are in Corpus Christy, Texas, where he works for the Sun Oil Company. . . . **Carl Schumacher** is Manager of Pesticide Operations at Monsanto Company, Agricultural Division, in St. Louis. Carl and Jane have two daughters Nancy, 8, and Janet, 7. As reported in April, **David Schaeffel** is also at Monsanto and Living in Kirkwood, Mo. . . . **George D. Spencer** has remarried and lives in Baltimore, Md., with his new wife Jane, and children Elizabeth, 8, and Eve, 6. George is working for Westinghouse and has maintained his academic interest taking graduate study in mathematics at Johns Hopkins University. —**Paul G. Smith**, Assistant Secretary 11 Old Farm Road, North Caldwell, N.J. 07006; **Howard L. Levingson**, Secretary, 358 Emerson Road, Lexington, Mass. 02173; **Water O. Davis**, Assistant Secretary, 346 Forest Avenue, Brockton, Mass. 02401; **Marshall Alper**, Assistant Secretary, 1130 Coronet Avenue, Pasadena, Calif. 91107

## 52

Its been a long time since I've gotten these notes out, and my box is jamed with material. Among those of 1952 in Vietnam is Major **Brian G. Moore** who is flying F-4 Phantom jets as a member of the 12th Tactical Fighter Wing at Cam Ranh Bay. . . . From the academic world, Herbert H. Woodson, '51, Pro-



Zenas Crocker, '52



Herbert Dow, '52

fessor of Electrical Engineering was appointed Philip Sporn Professor of Energy Processing at M.I.T. . . . **Dana W. Mayo** of the Chemistry Department at Bowdoin College, Brunswick, Maine, has been promoted full Professor. . . . At Union College, Schenectady, N.Y., **Kevork Nahabedian** has been promoted from Assistant to Associate Professor of Chemistry. . . . Industrially, **J. Burgess Jamieson** has been named General Manager of the Commercial Products Division of Electronic Memories, Inc., in Hawthorne, Calif., from where he will manage E.M.I. plants in Hawthorne, West Jordan, Utah, and Hong Kong. . . . **Herbert H. Dow** was elected Secretary of the Dow Chemical Company in Midland, Mich. Herb has been Secretary of the company's Executive Committee and other financial committees of the company, as well as being a member of the Board of Directors since 1953. . . . **Bill Morton** became General Systems Forecasting Manager for I.B.M.'s World Trade Corporation in White Plains, N.Y. . . . **Louis P. Deis** has been appointed Manager of the Downingtown, Pa., plant of American Viscose Division, F.M.C. Corporation. Louis had been with American Viscose since 1953, holding various executive and engineering posts, most lately Manager of Process Improvement of Film Operations. . . . **Bradley T. Sack**, A.I.A., has been appointed Vice President of Architecture for Corporate Design Consultants in Boston. . . . **Richard D. Ayers** and family are now in Rotterdam where he is Sales Manager of Chicago Bridge (Nederland), N.V. . . . **Stan Goldberg** is living in Brentwood, Calif.; and recently joined Schwabacher and Company as a stockbroker, and is very happy with the securities business after 15 years of manufacturing. . . . **J. R. Strawn** has been promoted to Supervising Geophysicist for Chevron Oil in Denver, Colo., having been Division Geophysicist in Casper, Wyo. . . . **Sture Blom** is acting Chief Electronics Engineer at Baird-Atomic, Inc., Government Systems Division, Waltham, Mass. . . . **Bill Chandler** is now Manager of Market Development for Sinclair Refining Company Western Region, Based in Barrington, Ill. . . . **Zenas Crocker** has been elected President of the Nixon-Baldwin Division of Tenneco Chemicals, Inc. (various plastic sheet and film products), having previously served as Vice President. He will still be in Nixon, N.J. . . . **S. H. Gelles** is in Columbus, Ohio, where he is Associate Chief of Materials Development at Batelle Memorial Institute. . . . **Dirk Plummer** and Janis, who were married last year, announce the birth of their first child, Julie. Dirk is with the Defense Department Camdend Contract Administration. . . . **Oscar W. Kaalstad** is currently Managing Director of Grace GmbH, and Adretta Weke Weber and Bandwon GmbH (two fully owned subsidiaries of W. R. Grace and Company) and is located in Hamburg. . . . **Richard Haley** is Manufacturing Manager, Helipat Division, of Beckman Instruments, Inc., in Fullerton, Calif.

A note from **Jack Larks**, who is down in Houston with N.A.S.A., says he has been lecturing civic groups on the Apollo program and the part Long Range Planning plays. . . . **Jim Davidson** is Vice President of F. R. Schwab and Associates, Inc., in New York, N.Y. Schwab is a general management consulting firm specializing in corporate strategy, organization, marketing, and executive search. . . . **Bob Lurie** is Manager of Materials Development Department at Avco Space Systems Division, Lowell, Mass. . . . **John Small, Jr.**, has been in The Hague for two years, and has been working on the geology of the United Kingdom and Norwegian parts of the North Sea for American Overseas Petroleum, Ltd. . . . **Gerald F. Laufs** has recently been elected to the Board of Governors of three separate pipeline companies in Germany; Nordrheinische Erdgastransport Gesellschaft, Mittelrheinische E. G. and Sueddeutsche E. G. Gerry is still with Esso in Hamburg. . . . **Nick Haritatos**, back from consulting in Madrid, Spain, has been working on the start-up of a new 1,500 ton per day ammonia plant in Pascagoula, Miss. . . . **Phillip Spiegelman** has returned to Wilmington, Del., After spending a year and a half on a pilot plant project in Beaumont, Texas. . . . **Doug Haven** has left M.I.T. to become a "Financial Navigator." Last October he joined Hogan, Ashford and Company in Boston, a small private firm now known as Hogan-Harvey and Company, Inc. The organization provides its clients with an objective professional service by which they can make various kinds of personal financial decisions more intelligently. From the way he described it, it sounded like a refreshingly different way to go about the business of planning with the long view in mind. And, speaking of "long views," Doug completed the course—all 26 miles, 385 yards of it—from Hopkinton to Boston in the B.A.A. Marathon on Patriots' Day. And that's it for the month. More later.—**Dana M. Ferguson**, Secretary, Box 233, Acton, Mass.

## 54

**Aristides Milotes** is Sales Manager for Math Applications Group, Inc., a scientific computer programming company, operating out of the White Plains, N.Y., and Lexington, Mass., offices. . . . **Warren Weatherill** and Francie announce the arrival of a son, Philip Hume, on January 24. . . . Major **Frederick Hofmann** has received his second award of the U.S. Air Force Commendation Medal at Andrews A.F.B. He was decorated for meritorious service as a Staff Development Engineer with Headquarters Ballistic Systems Division, Norton A.F.B., Calif. Major Hofmann is now assigned to Headquarters, Air Force Systems Command. . . . **James T. Duane** was recently appointed manager of G.E.'s newly created Speed Variator Department at Erie, Pa. His career with G. E. started in 1954.

A senior member of the Institute of Electrical and Electronic Engineers, and a Tau Beta Pi and Eta Kappa Nu member, Jim was named "Outstanding Young Electrical Engineer" by Eta Kappa Nu in 1962. He is active in Erie County civic affairs. . . . Major **Everett Chambers** played an important role in the development of the world's largest airplane, the C5 Galaxy, as a Systems Program Manager in Headquarters, Military Airlift Command at Scott A.F.B. Ill. . . . **Frederick Sander** was recently Chairman of a symposium on sub-synoptic meteorology. . . . U.S. Air Force Lt. Col. **James Putnam** has been decorated with the Bronze Star for meritorious achievement while engaged in military operations against the Viet Cong. He is now assigned to the Defense Atomic Support Agency (D.A.S.A.) headquarters, Washington, D.C., as a Staff Civil Engineer.—**E. David Howes, Jr.**, Secretary, Box 66, Carlisle, Mass. 01741

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This will be a mixture of recent items and some old ones; we trust the "old news" is still accurate. Last April **Harold Auslin** and Anne Marie Chenard of Swampscott were married there. A B.U. graduate, Anne was working at Salem Hospital while Harold taught physics at Wentworth Institute in Boston. . . . In October, 1967, **Stu Amstutz** and Carolyn Stevens, a Hood College alumna, were married. . . . From Central Connecticut State College in New Britain comes word of the recent appointment of **Herbert Slotnick**, S.M., as an Associate Professor of Chemistry. Herbert, Muriel, and their son and daughter live in West Hartford. Having received a doctorate from the University of Connecticut, another master's degree from Worcester Tech plus his bachelor's degree from Northeastern, Herbert was formerly a chemist at Pratt and Whitney and for 13 years an Adjunct Assistant Professor of Chemistry at the University of Hartford. . . . **Tom Hamilton** is back in school at the Harvard Business School; and he, Joyce, and their children are enjoying life in Cambridge. . . . Also increasing his knowledge this winter at the Institute of Chartered Financial Analysts at the University of Virginia was **Ralph Wanger**, Vice President of R. J. Levy, Harris, Inc., Chicago. . . . And **Walter Seelbach** was one of 14 February graduates of the Motorola Executive Institute in Vail. Walter, who lives in Scottsdale, Ariz., is with Motorola Semiconductor Products Division in Phoenix.

In the Washington, D.C., area **Dave Brooks** is now Chief of the Division of Economics, Bureau of Mines, Department of the Interior. In his final year with Resources for the Future, Dave took a leave of absence from the foundation to serve as Assistant Professor of Economics at Berea College in Kentucky. Now he, Toby, Michael, and Naomi are back at home in Arlington. . . . **Walter**



James T. Duane, '54

**Adey** is with the U.S. National Museum in Washington, and Lt. Col. **Archie Wood**, U.S.A.F., is a member of the Class of 1968 in the National War College nearby. . . . **Elliot Swanson** wrote in May, 1967, that he was currently in Annandale, Va., the Eastern Sales Representative of Time—Data Corporation, a new electronic manufacturing company with headquarters in California. . . . Lt. Col. **Leonard Sugarman**, Executive Office since 1964 of the Air Force Missile Development Center's Central Inertial Guidance Test Facility, Holloman A.F.B., N.M., last September received the 1967 Air Force Systems Command's Meritorious Award for Support Management. Leonard and Lois have four sons; one a naval lieutenant, two in college, and the youngest in school in Alamogordo. . . . Capt. **John Britt**, U.S.A.F., last spring received his fourth Air Medal for service in Southeast Asia. At the time he was an instructor pilot at MacDill A.F.B. in Tampa, Fla. . . . Major **Carl Hess** and Barbara spent 10 months in Ft. Leavenworth, Kansas, last year while Carl completed the course at the Army Command and General Staff College, graduating in June, 1967.

Last August, Caudill, Rowlett, Scott of Houston, architects, planners, and engineers, announced the election of **Jack Smith** of Rowayton, Conn., as an Associate Partner. Jack is Co-Manager of the New York City Office of the firm, having joined C.R.S. in Houston in 1960. In February C.R.S. announced that **Dan Stewart**, M.A.R., has also been elected an Associate Partner. Dan is Project Manager of International Projects, having been a designer with the firm since 1961. He has represented the firm in planning community-living centers in Santiago, Chile, and is presently in charge of the design of 50 junior-secondary schools in Jamaica. . . . Last June **Richard Varney**, Vice President of Varney brothers Sand and Gravel, Inc., a resident of Mendon, Mass., was elected a Director of the Milford National Bank and Trust Company. He is also a Trustee of Milford Hospital and Chairman of the Mendon Board of Appeals. . . . In December, 1966,



**Roy Salzman** was elected Vice President Technical Operations of Adams Associates, Inc., a newly created subsidiary of Charles W. Adams Associates, Inc. Roy is responsible for the firm's rapidly expanding computer consulting and programming activities at its headquarters in Bedford. He, Doris, Bradford, and Lynn live in Carlisle, where Roy was Chairman of the Carlisle Fair Practices Committee. . . . **Michael Greenberg**, '58, of Needham, joined the engineering staff of Bedford Associates, Inc., in September, 1967, assuming senior electronic design responsibilities there.

After nearly 10 years with *Chemical Week* at McGraw-Hill, **Phil Untersee** last year joined Arthur D. Little, Inc., as a professional staff member of the Service to Investors—Service to Management Program. He and Mary and their five children live in Natick. . . . **Roger Broadwell**, living in Sudbury Heights, N.J., with his wife and four children, is Manager of Application Development Engineering in the Technical Services Department of Titanium Metals Corporation of America in West Caldwell. . . . **Robert Farrah** has been with the Research Laboratories Division of the Bendix Corporation, Southfield, Mich., since 1959. He is the Assistant Department Head of the Thin Film Department, working on solid state and electro-optical devices. . . . On the West Coast **Bob Stone** has been with Garrett-Ai Research in Los Angeles for over five years, and he is now a Senior Preliminary Design Engineer, married to Pat Ellis (B.U., '56), and the father of two. . . . Doug Willis, '56, and his wife and two children live in Poway, near San Diego. Doug is working for the General Atomics Division of General Dynamics. . . . **Calvin Hecht**, with North American Aviation, Space Division, in Downey, living in Hacienda Heights, writes that he would like to hear from classmates in that area. . . . Goodness, guess we must save **Frank Bonner's** adventures in Sweden and **Jim Bartsch's** one-piece golf ball for yet another month.—Secretaries: **Dell Lanier Venarde** (Mrs. J. H.), 16 South Trail, Wilmington, Del. 19803; **L. Dennis Shapiro**, 130 Lincoln Street, Boston Mass. 02135

## 56

**Marv Bahnman** is still with Goodyear Aerospace in Akron but off hours he is the Cessna dealer at the Akron airport and operates a 10-plane flying club. He, Judie and their four children have recently moved to a new home in Talmadge, Ohio. . . . **Arnold Breeden** is working for L.T.V. Aerospace and lives in Arlington, Texas. . . . **Joe Collins** has been named Manager of Marketing Services in the Molecular Sieve Department of the Linde Division of Union Carbide. . . . **Ted Cross** is the co-author of an article entitled "Fracturing Oil Shale with Electricity" that appeared in the *Journal of Petroleum Technology* last January. Ted is an Electrical Engineer with Pacific Power and Light

Company in Casper, Wyo. a registered professional engineer in Wyoming and is doing graduate work at the University of Wyoming. . . . **Harold Friedman** was the author of an article entitled "Clad Wires for Electronics" in the January issue of *Electronic Packaging and Production*. Harold is with the marketing Services Group of the Metals and Control Division of Texas Instruments in Attleboro, Mass. . . . John Hayes, '55, is a Professor at Carnegie-Mellon University doing research on how to improve the learning process in education. He gave a presentation on how infants recognize words at a conference in March. . . . **Carlos Hilado** has become a member of the Editorial Advisory Board of the *Journal of Cellular Plastics*. . . . **Guy Ritter** is a member of the consulting structural engineering firm of Lindsey, Tucker and Ritter in Albany, Ga. . . . **Bjorn Rossing**, in addition to his work and municipal duties, is also Regional Chairman for the Alumni Fund in the Minneapolis area. . . . Meanwhile, back at the Institute, Alpha Phi Omega held its Spring Carnival and almost awarded its annual Big Screw award to **Bruce Wedlock**, Professor of Electrical Engineering and 6.02 instructor. . . . **Nick Wise** has left Analog Devices and is now with a small firm that builds power supplies. . . . See you all on June 10th—we hope!—Co-Secretaries: **Bruce B. Bredehoft**, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, M.I.T., Room E19-439, Cambridge Mass.

## 58

This issue should reach many of you just as you're packing your suitcase for the Reunion. For those of you who are able to come at the last minute, here are some ideas on what to wear, as compiled by your committee's answer to Amy Vanderbilt and Esquire—**Glenn Strehle** and Kathy: "If you're looking forward to a whole new wardrobe for our Tenth Reunion, look again. Dress will be casual for most of the weekend. You can arrive Friday afternoon in almost anything, although dinner and dancing that evening will call for sports coats for the men and simple summery dresses for the girls. Bermudas, slacks, and bathing suits will be the uniform for everyone on Saturday. Don't forget your tennis shoes, sunglasses, and a warm sweater. For the Saturday evening cocktail party and dinner, wear suit or sport coat (guys) and cocktail dresses (gals). On Sunday, shake the sand out of your sneakers and shorts and you'll be dressed for the rest of the Reunion." For a last minute reservation, call or wire Chester Peck, Manager, Provincetown Inn, Provincetown, Mass., telephone 617-487-9500. We'll see you there!"

For you stock-market buffs, **Arnold Armstutz** has been working in the area of computer analysis for investment management and has recently published a working paper on the subject at the

Sloan School. . . . **George Haines** co-authored an article "Does Consumer Advertising Increase Retail Availability of a New Product?" in *Advertising Research*. He is at the University of Rochester in the College of Business Administration. . . . **Richard Miller** is with Harbridge House, the management consulting organization, in Boston, and has recently presented papers concerning the impact of the Patent Reform Act on university research and patent policies. . . . **Edmund Vinarub** is working at Kollsman Instrument Corporation as Staff Systems Engineer for the Corporate Technology Center. . . . **Edward Goldman** is presently Chief Engineer at Mitron R. and D. Corporation, and working toward an M.B.A. at Boston College in the evenings. . . . **John Cassidy** has joined the staff of Arthur D. Little, where he will specialize in designing circuitry for physics experiments. . . . **Giyora Doeh** writes: "Presently employed at T.R.W. Systems Group in management systems operations, pursuing a spectrum of interests ranging from implementation of new employee saving plan to development of systems for controlling technical accomplishment on projects. Happily mortgage-paying with wife, Wendy, son, Cole, and daughter, Tammy—and we'd welcome visitors." . . . The news is brief this month as we are getting ready for the Reunion. Regards.—**Michael E. Brose**, Secretary, 1171 North Street, Walpole, Mass.; **Antonia D. Schuman**, Western Associate, 22400 Napa Street, Canoga Park, Calif.

## 59

Happy June, and may I remind you that our Tenth Reunion is only a year off. How's that for jumping the gun? Actually, a year is not a very long time when it comes to planning such an affair. If you happen to have any swinging ideas, or if the spirit should move you to volunteer aid, by all means contact a Class Officer. I'll try to keep you posted on developments through this column until things get underway.

And now for the news. . . . The M.I.T. Sloan School has announced the list of Fellows for the '68-'69 year. Included in the list of 50 young executives chosen by their companies and M.I.T. for this excellent program is **Geroge Haymaker**. George is Manager of the Forecasting Division, Economic Analysis and Planning Department of the Aluminum Company of America.



J. Joseph Collins, '56



Christian Schlemmer, '59



**Christian Schlemmer** has been appointed Manager of the Wood Products Section of the Film Department of Rohm and Haas. In this capacity he will be responsible for marketing the firm's new all-acrylic films to manufacturers of wood products. Chris received his M.A. from Stanford in 1961, is married, and has one daughter. . . . **Aaron Rosenberg** went on from M.I.T. to the University of Pennsylvania receiving his Ph.D. in E.E. from there in 1964. Since then, he has been with the Bell Telephone Labs where he is doing research in speech and hearing. He married B.U. graduate Judith Fishman in 1961; they now have two boys, aged 5 and 2. . . . Must sign off now. Sorry for the brevity, but I hope it's better than nuthin.—**Glenn Zeiders**, Secretary, 3 Rose Avenue, Watertown, Mass. 02172

## 60

**Fred Kinch** and Billie announce the birth of a son, Frederick A. Kinch, 3d, on March 17, 1968. . . . **Ferrel Stremier** is Assistant Professor of Electrical Engineering at the University of Wisconsin in Madison. . . . **Al Krigman** is now Associate Editor of *Instruments and Control Systems* Magazine in Pittsburgh. . . . **Lawrence Israel** and Rhea and their two daughters are living in Allentown, Pa., where he is with Air Products and Chemicals, Inc. . . . From the mailbox: **Joel Winett** reports: "We have a daughter, Barbara Jo, born on Shakespeare's Birthday, April 23, 1967. We have also just bought a house and moved to Framingham (Mass.)." Speaking of buying houses, Chris and I have made an offer on a large Victorian thing in Cambridge, and by the time you read this we may actually own the place. In such a case, you are invited—nay, encouraged—to drop by after Alumni Day (or even before, for that matter) to chuckle at what we have managed to get ourselves into. Speaking of Alumni Day (notice how this narrative flows from one subject into the next), I hope a large contingent of the Class '60 will join me. It's so embarrassing to try to single-handedly drink up the whole classes' share of the cocktail party.

Returning to the mail now, **Morris Salame** writes: "In 1960 I joined Monsanto (Packaging Division) and in 1963 was made Group Leader, Exploratory and Fundamental Research—Packaging Materials. In 1967 I became Research Specialist in High Polymer Properties. I am now studying for my master's degree in polymer science and engineering at the University of Massachusetts." . . . **Anthony Fazzari** is married to the former Sheila Slezak (B.S. from State University of New York, M.S. in biology from Rutgers). He is now working for Union Carbide Plastics—R. and D. . . . **George Meyers** says: "I am stationed on the outskirts of Tokyo. As a Captain in the Air Force, I run a small office (three people including me) whose job is tailoring communications and radar equipment for installation at

various airfields for use as air traffic control systems. In the winter I spend all my spare time skiing, and during the week I keep busy conducting two English classes, attending a Japanese class, and coaching a swimming team of children of local military people." . . . Other news from the Spragues: Chris will be teaching at various Sloan School summer programs this summer and I will be working for BioDynamics in Cambridge; in the fall I'll go to work as a Research Assistant for the Harvard Business School to keep me out of mischief while I'm getting ready for my special field examination in their doctoral program. So we'll be around all summer. If you're in town, drop by or give a call so I can report on your activities—or at least that subset which you wish to have made public. Keep the cards and letters coming to—**Linda G. Sprague**, Secretary, 345 Brookline Street, Cambridge, Mass.

## 61

As the school year draws to a close, the news grows quite sparse. Only five notes this month; the rest are old press clippings. **Ronald Yoo** wrote that he "recently became Manager of Data Processing Section of the Aerospace Corporation in El Segundo, Calif., working on military space systems. I spent a year and six months previous to that with Communications and Systems, Inc., in Falls Church, Va., in the Management Sciences Division working on Naval Communications Systems." . . . Back to the scholastic grind is **John Layter**. He wrote that "after spending the four years following graduation in Europe studying philosophy and assorted subjects, I've returned to physics at Columbia University. I'm just starting work on a thesis, on K mesons, and still hope to finish before I'm 30." Gad! Thirty! We are all beginning to go over the hill! . . . **Mike Schneier** married one Jane Hall, an elementary school teacher in Rochester, N.Y., in April. . . . **Curtis Tarter** got a Ph.D. from Cornell last year, in physics, and now has switched coasts, going over to Lawrence Radiation Laboratory in Livermore, Calif. . . . **Arthur Delagrange**: "I have acquired a wife as of September 9, 1967; the former Janice Cecelia Greenwalt. I still work at the Naval Ordnance Laboratory in Silver Spring, Md. My wife works there too." . . . A clipping from an unidentified newspaper tells of **Carl Wagner's** victory in the Intercollegiate Chess Tourney in Hoboken. Carl is one of 128 chess players in the U.S. who now can be called a master, officially. Carl is still at M.I.T. on his way to a doctorate in Nuclear Engineering.

There is a slow movement of the class from the student side of the lectern to the blackboard. At Manhattan College in the Bronx **James Manganaro** is an Assistant Professor of Chemical Engineering. **Charley Ruttenberg** is also an Assistant Professor at the American University in D.C. in the Department of

Government and Public Administration. . . . **Lennard Spar** is Director of Marketing for Arcon Corporation. . . . **William Hecht** is Executive Secretary of M.I.T.'s Educational Council. He is also an Assistant Director for the Admissions Office. . . . An interesting company I would like to know more about is Tech Films. It was started by **Bill McCrae**. It's in Holliston, Mass., and is primarily involved with the filming of sophisticated scientific and technical projects. . . . **Fred Salvucci** is working for the great society on the Boston Redevelopment Authority. . . . Finally I would like to inject a sober word. I am writing this a couple of days after the death of Martin Luther King. Many white people are asking themselves, as they have never asked before, how they can help the black man in America. They do nothing because they can't think of anything to do. It seems to me that they are thinking in terms of helping in the black ghettos. Perhaps they should look in their own neighborhood. Most of us live in the suburbs. Perhaps the real fight is outside of the core city. Are you helping Negroes to find homes in your area? Is there any low income housing in your town? Do the books in the public schools give a realistic picture of the contributions of black Americans? Do you speak out when you hear racist comments in your neighborhood? Are Negroes getting a fair shake in job opportunities in your town, in your company? The responsibility is on us. Will we let the black man down again?—**Andrew Braun**, Secretary, 131 Freeman Street, Brookline, Mass. 02146

## 62

**Jose M. Ochoa-Pile** finished his assignment as Hydrology Consultant for the Watershed Management Program for United Nations and the Government of Venezuela. He is currently doing irrigation and hydrology consulting work for IFPA and El Tocuyo Sugar Factory in Barquisimeto Area, Venezuela. . . . A maritime management consulting firm, Shipping Intelligence, was recently founded by **Sydney P. Levine**. . . . **Nathan R. Hopton**, who is married and has three children, is now working for a private consultant as a Soils and Foundations Engineer reviewing State of Connecticut highway plans for proper soils design. He took a leave of absence in 1967 to obtain an M.S. in soils engineering under the direction of Kent Healy, '63, at the University of Connecticut. Nathan is now studying part-time to obtain a Ph.D. in Soils. . . . Since graduation, **Raymond P. Wenig** has worked for C-E-I-R, Inc., in the management sciences area, and is currently the Regional Manager of their New York City office. In 1963 Ray married Sandra L. Nickles (sister of David Nickles, '62) and they have a 8 month-old daughter named Julie Lynn. . . . **Jack E. Charipar** has been appointed Managing Director, Barreiros-Chrysler, Spain. . . . **Lewis M. Norton**, who received his Ph.D. in math from M.I.T. in '66, reports that he

married Judith A. Edwards, '64, and they have a son, John Edwards, born October 30, 1967. Lewis is presently employed at MITRE Corporation, Bedford, Mass., in Language and Text Processing Sub-department. . . . **Harold G. Snyder** is presently serving as an Information Secretary for the staff of General Meszar, U.S. Army, and plans to visit Boston and the Harvard-M.I.T. area for about two weeks beginning February 24, 1968. . . . **Jerry Goldberg** announces his engagement to Miss Marcia Far-gotstein of Altoona, Pa., and plans for a June wedding. They plan to settle in Washington, D.C., where Jerry will continue his present work with the Department of the Navy. He also reports that there are several M.I.T. grads in his department. . . . **William T. Walter** has recently joined the research staff of the Polytechnic Institute of Brooklyn as a Research Scientist in the Electro-physics Department. He had been doing laser research at T.R.G./Division of Control Data Corporation. Dr. Walter reports that six physicists have just joined the Polytechnic group from T.R.E. and together with the staff already there, this is presently the largest group at a senior level at any college or university. In the nation doing research in quantum electronics and lasers. . . . **Richard A. Crowell**, head of the Investment Technology Group of the Boston Safe Deposit and Trust Company has been appointed Investment Technology Officer. Mr. Crowell holds bachelor's and master's degrees from M.I.T. . . . **Bill Bloebaum** and Margaret should have had their second child by now. They are living in a new home in Palos Verdes; Bill works at Cosmodyne on projects evaluating new marketing areas and new product development. . . . **Don Dible** was promoted to Engineering Manager of the Ferrite Devices Lab of Melabs, Palo Alto, Calif., and received his M.S.E.E. from Stanford University on January 5, 1968.—**Gerald S. Katell**, Secretary, 310 Hage Building, Seattle, Wash. 98104

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**David Caldwell** writes us from Vietnam where he is presently Site Commander for the USASTRATCOM Long Lines Detachment at An Khe. The unit operates one of the fixed stations in the Defense Communications Systems long-haul communications network for Southeast Asia. . . . **Nelson Heller** recently returned from the University of Lancaster in England where he spent six months in the OR Department as a participant in an exchange program with the University of Pennsylvania. He is now doing research on crime control. . . . **James Yue-Tak Tang** finished his Ph.D. in aerospace engineering Cornell and is now at Bell Labs working with the Re-entry Physics Group. . . . **Richard Waldman** will start as an intern at N.Y. Mount Sinai Hospital this summer after getting his M.D. from N.Y.U. . . . **Jerome Glaser**

is now an Assistant Professor of E.E. at the Institute. . . . **Mike Weisskoff** is finishing his second year at the Sloan School. . . . **William Pokross** is teaching and working toward his Ph.D. in economics at University of Pittsburgh.

**William Vachon** is working at the M.I.T. Instrumentation Lab. . . . **Richard Silver** recently got his Ph.D. in biochemical engineering from the Institute. He is now with Gulf Research in Pittsburgh. . . . See you at the Harborside Reunion. Send any news you might have to—**Bob Johnson**, Secretary, 209 East 66 Street, New York, N.Y. 10021

## 64

The news this month is from the Alumni Fund envelopes, with the exception of letters from **Gene Merrill** and **Jerry Weiner**. The fact that a good number of our Class are contributing to the Fund is heartening, as is the fact that a few classmates like Gene and Jerry are taking the time to contribute news directly to this column. And now for that news:

**Robert Clark** will receive his law degree this June, and is planning to take the Washington, D.C., bar exam that month. His subsequent plans will depend upon the vagaries of Uncle Sam. . . . **Barbara Cohen** has served her apprenticeship in the advertising business, working for a New York ad agency in the industrial accounts section. She is enjoying her work and assembling a varied portfolio of her work.

**Ernest Cohen**, who has provided information of three other classmates reported herein, is working as a Systems Research Engineer at the Foxboro Company in Foxboro, Mass. . . . **Giles Crimi** received his Ph.D. in E.E. last year at the University of Pennsylvania. He is presently employed by G.E. in their Space Sciences Laboratory, where he has experimented in plasma physics under a N.A.S.A. contract. . . . **Patricia Crowther** had her first child last July. She is working part-time at Lincoln Laboratories and spends a portion of her spare time rock-climbing.

**James Dorr** is approaching his Ph.D. in English at the University of Indiana, where he also works part-time as a technical writer at the computing center. In addition to trying to have a few of his short stories published, he is reported to be dating a belly dancer! . . . **Edwin Duffin** is working on his Ph.D. at the University of Pennsylvania in biomedical engineering. His research topic concerns the functioning of the heart. . . . **Bill Eagleson** is married to the former Leatrice Wesson and lives in Detroit, where he is employed by Ford in its research labs. . . . **A. W. England**, who received his Ph.D. at M.I.T. in '64, is now a scientist-astronaut with N.A.S.A. . . . **Bill Euerle** is working for the Foxboro Company in the Systems Division. . . . **Jeffrey**

**Friedberg** received his M.S. in geophysics at Cal Tech, and is now working in underwater acoustics for Alpine Geophysical Association. He has been married two years now, during which time he spent three months cruising around the South China Sea as part of his job. . . . **John Graham** will receive his M.D. from the University of Minnesota this June. He plans to intern in California, after which he expects to be tapped by Uncle Sam. He was married to the former Elizabeth Adler of Ithaca, N.Y., last year.

**Bruce Hopkins** left Kodak in 1966 to become a Project Engineer with Ritter Equipment Company, where he is designing various types of medical sterilizers and developing new concepts in instrumentation for dentistry. . . . **Joe Kasper** expects to receive his Sc.D. this summer in Course 16 at M.I.T.

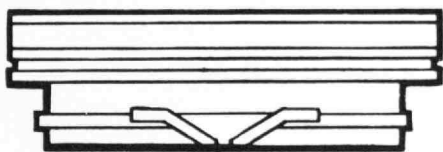
**Jerry Luebbers**, our V.P. and Representative to the Alumni Council, is involved in security analysis with Donaldson, Lufkin and Jenrette in N.Y.C. He finds bachelor life in Fun City grand, and offers to swap hot stock tips on a 1:1 basis. . . . **Clarence Malick** is now on active duty with the Navy, where he is stationed in R.I. with the Civil Engineering Corporations. He was married to the former Joan Bradner in 1965. Law School is his goal after discharge. . . . **Gene Merrill** received his Ph.D. at M.I.T. last December in biology. He worked in the E.E. Department there until May, when he left for London to join the research staff in the Department of Anatomy at the University of London. He plans to continue his work there in respiratory neurophysiology. His wife is the mother of their year old daughter, as well as the bearer of an M.S. degree from Northeastern. . . . **Robert Muhr** is working as an engineer for McDonnell Douglas in Florida, where his current project is the Oragon Missile Program. . . . **Bill Murphy**, '65, along with his wife and daughter, are living in Baltimore.

**Geoffrey Nelson**, received his M.B.A. at Stanford in 1966, and is now the Manager of the Market Analyzing Section of Cummins Engine Company. He is the proud father of a son almost two years old. . . . **Allen Press** received his M.A. in psychology at Clark University in June of 1967. . . . **Lawrence Rabiner** received his Ph.D. in E.E. at M.I.T. last June. He is now employed by Bell Labs in the Auditory and Speech Research Department. His bachelorhood will end this month with his marriage to Miss Suzanne Login of Rockway, N.J. . . . **Jerry Weiner** has left General Dynamics to become General Manager of B and H Amusement Rides in Fort Worth, a firm making \$15,000 to \$20,000 carnival rides. His wife Sylvia, B.U. '66, does the art work for the business. With Jerry's Tech training, we can hopefully look forward to taking our children on some interesting new rides! —**Ron Gilman**, Secretary, 1021 Oakmont Place, Apt. 8, Memphis, Tenn. 38107

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